

P016 Proportional cancer mortality among tannery workers

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Objective. The aim of this study was to examine cancer mortality among 3500 tannery workers (2150 men and 1250 women) who had been employed at Minsk Tannery Enterprise for at least 6 month in 1953-95.

Methods. We used individual employment records to reconstruct exposure level, occupation, calendar time and age hired. Data of Minsk Archive of Civilian Registry Bureau was used to determine the causes of deaths (total 602 deaths, 353 females and 249 males). Proportional mortality ratios (PMR) and proportional cancer mortality ratios (PCMR) were calculated using the Minsk-city population statistics to generate expected numbers.

Results. We found a non significant increase in the PMR for all cancer sites among women (women: PMR=115, 95% CI=97.3-134.5; men: PMR=86.0, 95% CI= 68.9-108.6). To reduce the Healthy Workers Effect we have calculated PCMR for different cancer sites. Among men, a significant increase was shown for larynx-oral cavity cancers (PCMR=326, 95% CI=174.4-613.2); liver-pancreas-gallbladder cancers (PCMR=243, 95% CI=138.7-423.2); and lung cancer (PCMR=178, 95% CI=132.3-238.6), and a non significant increase was shown for melanoma and skin cancers (PCMR=257.2, 95% CI=64.3-1028.6), rectum cancer (PCMR=161, 95% CI=67.74-381.6). Among women, we found a significant increase in the PCMR for liver-pancreas-gallbladder cancers (PCMR=196, 95% CI=134.6-286.4), and melanoma and skin cancers (PCMR=562, 95% CI=289.0-1089.5), and a non significant increase for bladder-kidney cancers (PCMR=148, 95% CI=60.7-363.1) and female genital cancers (PCMR=121, 95% CI=83.9-175.9). There was evidence of a linear trend for an increasing proportions of cancer deaths with duration of employment (chi-square=5.2; p<0.05 for both genders; chi-square=6.3; p<0.025 for men; chi-square=0.2; p>0.5 for women). Using regression analysis, we found a positive association between the increase in PMR of all cancers sites and the duration of employment in tannery production. The correlation coefficient for men ($r=0.88$) provided strong evidence of the association, while the correlation was very weak for women ($r=0.2$).

Conclusion. These differences between male and female tannery workers are thought to be due to men having been employed mainly in heavy processes, with huge chemical exposures to agents such as bichromates, inorganic acids, formaldehyde and leather dust, while women have been occupied in less heavy processes with exposure to organic chemicals, such as aniline, benzidine dyes and solvents. It is important to note that the main strategy of leather production is to use the most hydrophobic reagents for the deepest leather impregnation, which also facilitates their penetration via the natural barriers of the human organism.

P017 Occupational risk factors of male breast cancer: a European case-control study

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Background. Several occupational and environmental exposures including organochlorine pesticides, PCBs, PAH, solvents, and ELF-mag-

netic fields have been suspected to increase the risk of breast cancer. However, the role of these exposures is not easily detected in occupational studies among women, because of low exposure or confounding from reproductive and endogenous hormonal risk factors. Since breast cancer in men is a rare cancer, fewer risk factors are expected. Some of these may have an occupational origin. The identification of occupations at increased risk for male breast cancer (MBC) may help to identify carcinogenic agents for this cancer in both genders.

Methods. A case-control study on 7 sites of rare cancers was conducted in 8 European countries, including cases of MBC aged 35 to 70 years, who were diagnosed from January 1995 through June 1997. The study used either a population-based design in 5 countries, with controls selected from population registers, or a hospital-based design, with controls selected among other patients with colon cancer. The controls were frequency-matched to the cases by age group, and geographic area. Information on socio-demographic characteristics, lifestyle habits, previous medical conditions, and detailed occupational history was obtained. Odds ratios for MBC in subjects ever employed in an occupation were adjusted on age and country, using unconditional regression analysis.

Results. The analysis included 104 MBC cases and 2106 controls. Among occupations where at least 3 cases had been employed, elevated odds ratios were observed for metal casters (OR 4.6; 95% CI 1.3-17.0), paper makers (OR 3.4; 95% CI 1.2-9.3), motor vehicle mechanics (OR 2.3; 95% CI 1.1-4.8), printers (OR 2.8; 95% CI 1.0-8.3), painters (OR 2.5 95% CI 1.1-5.7) and dockers (OR 2.3; 95% CI 1.2-4.27). The results remained unchanged after adjustment on non-occupational risk factors.

Conclusions. Elevated risk of MBC has been documented previously in similar occupations such as foundry workers, printers or mechanics. The workers employed in the high risk occupations are possibly exposed to suspected carcinogens for breast cancer, such as PCBs and heat in metal casters, alkyl phenol polyethoxylate and PCBs in paper makers, HPA and gasoline in mechanics, or solvents in printers and painters, suggesting a causal link between employment in these occupations and breast cancer. Further investigation is being conducted, using expert assessment of exposure to suspected substances based on job description provided by the subjects.

P018 A mortality study of shoeworkers exposed to solvents: an update

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Background. This study updates the mortality of a cohort of shoe workers exposed to organic solvents. The original study closely examined the possibility of excess leukemia mortality since toluene, a homologue of benzene, was used in the manufacturing process. That study did not find an excess for leukemia but did find a statistically significant excess of lung cancer mortality.

Methods. Two shoe manufacturing plants, located in the state of Ohio (United States), were selected for this study. Both plants began operation in the 1930's, maintained adequate employment records, and conducted similar shoemaking processes. Workers that accumulated one month or more employment at either plant during the years 1940-1979, the time period covered by work records collected by NIOSH, were included in the analysis. Vital status follow-up was ascertained through December 31, 1999 using the National Death Index and other sources. 7,828 workers, contributing 300,777 person-years-at-risk, were available for analysis. 67.5% of this cohort were female, 32.5% were male. Only five members of this cohort were non-white. Through 1999, 40% of this cohort were deceased. Analysis conducted included calculating standardized mortality ratios (SMR) for selected causes of death and tests for trend with duration of employment.

Results. The original finding of excess lung cancer deaths in this cohort persisted with additional years of follow-up: SMR=1.36, confidence interval (CI)=1.19-1.54. This excess was found in both females

(SMR=1.26, CI=1.04-1.52) and in males (SMR=1.45, CI=1.22-1.71). The risk was elevated in both plants but was only significant in Plant 2 workers (SMR=1.43, CI=1.22-1.66). A stratified analysis identified the highest mortality elevation among workers in Plant 2 who were employed less than two years (SMR=1.70, $p<.01$). Trend tests did not indicate statistically elevated positive trend between lung cancer risk and duration of employment. The use of county rates to control for the possible confounding effects of smoking did not eliminate the lung cancer excess risk. No significant excess in leukemia deaths were found in any analysis conducted.

Conclusion. This study indicates that there may be an association between lung cancer and exposure to chronic, low levels of organic solvents. Although the strength of this association is weakened by the lack of increasing lung cancer risk in relation to duration of employment, other studies have supported this association. Study limitations include the lack of detailed exposure records over time and the absence of individual smoking histories.

P019 Prostate cancer and agricultural activities and exposures

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Background. Several studies have shown an increased risk of prostate cancer among farmers (1-3). No specific associations with agricultural chemicals such as pesticides has emerged until now, however, and the need for studies looking at particular exposures has been recently underlined (4). Purpose of the present report was to evaluate the association between prostate cancer and farming, also considering exposures to specific pesticides.

Methods. Data herein presented were derived from a hospital-based multi-site case-control study carried out in five Italian rural areas between 1990-1992. Within this study, 124 new cases of prostate cancer were ascertained and interviewed, along with 716 cancer controls. A team of agronomists assessed past exposure to pesticides by using a checklist of 100 chemical families and 217 compounds applied from 1950 to 1985 in the areas considered. The association between prostate cancer and different occupational risk factors was measured by maximum likelihood estimation of the odds ratio, controlling for potential confounders.

Results. Ever been employed in agriculture was associated with a 40% increased risk (OR=1.4, 95% CI 1.0-2.0). Prostate cancer was also positively related to food and tobacco (OR=2.1, 95% CI 1.1-4.1), and chemical products (OR=1.9, 95% CI 0.6-6.1) industries. The excess of prostate cancer reported among farmers and agricultural workers was specifically related to growing fruits (OR=2.0, 95% CI=1.2-3.5), and use of pesticides (OR=1.7, 95% CI=1.2-2.6). The observed risk increased with number of years spent mixing and applying (p -values for trend=0.003). The analyses performed in order to estimate the association between potential exposures to different types of pesticides and prostate cancer showed increased risks among farmers exposed to organochlorine insecticides and acaricides (OR=2.0, 95% CI 1.2-4.0), more specifically to the closely used compounds DDT (OR=2.2, 95% CI 1.2-4.0) and dicofol (OR=2.5, 95% CI 1.4-4.6), whose effects could therefore not be well separated.

Conclusion. The observed results suggest that experimental studies should elucidate if dicofol, a still widely used organochlorine pesticide, may act as an activator of prostate cell proliferation or exert endocrine effects suspected to promote hormone-dependent cancers.

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P020 Association between sinonasal cancer and tannery industry in Tuscany

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Background. Sinonasal cancers are rare tumors, being no more than 0.5-1% of all malignancies. Adenocarcinomas represent approximately 10-20% of all primitive neoplasms of the nasal and paranasal cavities. Among all sinonasal cancers, the intestinal type adenocarcinoma (ADCI) has been more frequently associated with occupational exposures. Several studies, carried out mostly during the last three decades, have proved that nasal and sinonasal cancers are causally linked with exposure to nickel and chromium in metal-working industries, pesticides in agriculture, wood dust in the furniture industry and leather dust in boot and shoe manufacturing. The present case-control study focused on the possible association between the ADCI of the nasal cavities and the exposure to carcinogens in the tanning industry.

Subjects and methods. The 15 samples from case group were re-diagnosed according to Mills and Fechner classification. Data were collected using both clinical records and a standardized questionnaire. A questionnaire was administered directly to the patients or to other family members, in case of deceased patients. Controls were recruited among patients suffering with benign diseases. Cases and controls did not differ statistically in terms of smoking habits, age at diagnosis and sex distribution. Statistical analysis was performed using the EPI INFO 6 analysis package (CDC, Atlanta US).

Results. Four out of the fifteen cases had worked in the tanning industry. The association between tanning activities and ADCI sino-nasal cancer was statistically significant ($p<0.001$). Consistent with previous publications, shoe and boot manufacturing ($p<0.001$) and wood-related activities ($p<0.05$) were found to be associated with an excess risk of this cancer. No association was found with smoking habits.

Conclusion. Results of an increased risk of sino-nasal cancer in industries other than wood and leather-related jobs (including the tannery industry as well), are still inconclusive. There are no published reports of an increased risk of sino-nasal cancer in tannery workers, which is surprising, especially considering that tannery activities imply continuous exposure to various carcinogens, such as tannins and chromium salts. The present study, even though small-sized, confirmed the well-known association between wood and boot and shoe manufacturing employment and increased risk of sino-nasal ADCI. In addition, this is the first study to find a statistically significant association between sino-nasal ADCI and tannery employment, confirming some previous isolated reports of single cases among tannery workers.

P021 A case-control study on risk factors for uveal melanoma

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Background. Uveal melanoma is the most common primary intraocular malignancy and the most common reason of enucleation in adults. The annual incidence of intraocular melanoma is 0,62 per 100,000 population in Lithuania.

Objectives. To define the relationship between uveal melanoma and occupational and nonoccupational risk factors.

Methods and study population. A case-control study was conducted in 1995-2000. 55 cases of primary histologically confirmed uveal melanoma at the age 35-75 and 202 hospital controls matched by age and sex were compared regarding occupations, education, smoking habits and alcohol consumption, hair and eye colour, tendency to sunburn, and medical history. Crude odds ratios and odds ratios adjusted

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