08A.4 ASBESTOS EXPOSURE AND PROSTATE CANCER, REALLY?

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Background General population exposure to asbestos from residential insulation and from environmental sources during childhood have recently been associated with prostate cancer. While asbestos fibers can be found in the prostate of workplace-exposed men at autopsy, few occupational studies have reported on asbestos exposure and prostate cancer incidence. We examined the association between lifetime occupational exposure to chrysotile asbestos and prostate cancer risk in a large population-based case-control study.

Methods Cases were 1933 men with histologically-confirmed incident prostate cancer, aged ≤ 75 years, diagnosed in 2005–2009 in Montreal. Concurrently, 1994 population controls from the same residential area and age distribution were randomly selected from electoral lists. In-person interviews elicited detailed socio-demographics, lifestyle and work histories. Industrial hygienists used job-specific information to provide semi-quantitative evaluations of intensity and frequency of exposure to 345 chemical agents, including asbestos, and a measure of confidence in the evaluation. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for prostate cancer risk associated with exposure to chrysotile asbestos.

Results After restriction to probable and definite exposure, and application of a 5 year lag, 12.5% of cases and 11.8% of controls were ever exposed to asbestos (OR=1.1, 95% CI 0.9–1.3). For duration of exposure, there was no increase in risk of overall prostate cancer in the lower tertiles of exposure but risk was elevated in the upper tertile (OR=1.6, 95% CI 1.2–2.2). Similarly, for cumulative exposure, risk was elevated in the upper tertile only (OR=1.5, 95% CI 1.1–2.1). Analyses considering tumor grades also showed a higher risk in the upper tertile of cumulative exposure for non-aggressive (OR=1.5, 95% CI 1.1–2.2) and especially aggressive (OR=1.9, 95% CI 1.2–3.0) cancers.

Conclusion Our findings are consistent with an increased risk of prostate cancer with prolonged and high cumulative exposure to chrysotile asbestos, and particularly for the aggressive form of the disease.

08A.5 TOTAL ENERGY EXPENDITURE AND RISK OF LYMPHOMA SUBTYPES: RESULTS FROM THE EUROPEAN EPILYMPH CASE-CONTROL STUDY

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Introduction Physical activity is known to convey protection against several cancers, but results on risk of lymphoma and

its subtypes have been inconsistent. A possible reason might be confounding by workplace exposures associated with occupational energy expenditure, which was not considered in studies of recreational physical activity. It is also unclear whether energy expenditure acts directly, or through preventing obesity.

Objectives To investigate the role of energy expenditure, including occupational and recreational physical activity, on risk of lymphoma subtypes.

Materials and methods Based on questionnaire information on lifetime recreational physical activity and lifetime occupational history available for all participants to the multicenter EpiLymph case-control study, we estimated energy expenditure at work by occupational ISCO68 code, and we applied it to the work histories of study subjects. We also categorized hours of lifetime recreational physical activity into quartiles. We calculated risk of lymphoma subtypes with unconditional polytomous regression analysis, associated with increasing categories of lifetime energy expenditure at work (EEW), increasing categories of recreational physical activity (RPA), and their interaction term (total energy expenditure, TEE), adjusting by age, gender, education, body mass index (BMI), and history of farm work and solvents use.

Results Risk of lymphoma overall, diffuse large B cell lymphoma and multiple myeloma was not associated with EEW, RPA and TEE. Risk of follicular lymphoma and chronic lymphocytic leukemia associated were elevated with medium and high EEW (OR 3.1, 95% CI 1.5–6.1; OR 2.5 95% CI 1.2–5.1, respectively), but there was not a significant upward trend.

Conclusions Further epidemiologic and mechanistic research is warranted to assess the role of physical activity in the etiology of lymphoma subtypes. New standardized energy expenditure assessment methods, as the ones herein developed, might contribute to a better understanding of the nature of the observed inconsistent findings.

Occupational Health Effects of Heat

08B.1 RISK OF HEAT RELATED ILLNESS IN LATINO AGRICULTURAL WORKERS: ENVIRONMENTAL TEMPERATURE AND ACTIVITY LEVELS

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Introduction Farmworkers are at risk of heat related illness (HRI). The main contributors are thought to be environmental temperatures and activity levels, but the association has not been objectively assessed.

Methods California farmworkers were monitored for one work-shift each in the summers of 2014 and 2015. Interviewers recorded personal and demographic information. Wet bulb globe temperature (WBGT) was collected in minute intervals over the shift as were accelerometer activity data from each participant. This data was grouped into physiologically meaningful 15 min increments, with the average used for analysis. Data from the previous 15 min were used to predict current activity. Generalized Additive Modeling was used to determine the form of the association between WBGT and

activity level. This information was used to build an appropriate repeated measures model including demographics and work-related attributes.

Results Final analyses included 318 Latina/o farmworkers. Only 70 subjects (22%) were a healthy BMI, and 115 subjects (36%) were considered obese (BMI ≥ 30). None were underweight. The majority of participants were paid hourly (n=233, 73%) as opposed to piece-rate (n=85, 27%). Activity counts averaged 452, or a low intensity activity level. In the final repeat measures model, work activity was inversely associated with WBGT, for every oC increase in WBGT activity decreased by 4.5 counts (95% CI 1.2–7.6) P 0.01. Other independent negative associations with activity were found with age and male gender. An interaction was found between piece-rate workers and gender. Male piece rate workers did not decrease activity levels with WBGT, but females and hourly paid workers did.

Conclusion In general, farmworkers decrease their work activity with increasing environmental heat. Men, especially piece-rate workers are less likely to decrease their activity levels putting them at increased risk of HRI.

08B.2 EPIDEMIOLOGICAL DESCRIPTIONS OF OCCUPATIONAL HEALTH EFFECTS OF CLIMATE CHANGE

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There have been many laboratory studies of the effect of heat on the health of individuals in sport, at work or in the military. However, epidemiological studies are needed to develop impact assessment of climate change. In this presentation we outline the development and use of population-exposure risk functions for different heat effects.

The first risk function is for heat discomfort based on the predicted mean vote with 10% population feeling discomfort at WBGT=21C and with 90% affected at 29C.

The second population risk function is for heat exhaustion which we derive by using epidemiological data from the US military. 10% of the population is affected by heat exhaustion at WBGT=31C increasing up to 90% of the population affected at a WBGT=38C.

The most severe population risk is heat stroke for which we use hospital data to calculate 10% of the population affected by heat stroke at WBGT=41C and 90% of the population at WBGT=44C.

These health effects of heat create different durations of ill health, with serious heat stroke causing prolonged periods of disability. Based on climate modelling and our risk functions the number of people affected globally can be calculated. For heat stroke, few persons working in the shade at 300W metabolic rate, will currently suffer from heat levels that can cause heat stroke. By 2085 half a million workers (at 300W) will be exposed to heat levels that cause heat stroke. As for becoming totally exhausted (and unable to work) while working at 300W in the sun, currently that stands at about 124 million worldwide, but in 2085 that number will jump to 835 million.

Additional epidemiological studies are utilised to validate these risk estimates at local and national level.

08B.3 HEAT AND INJURY IN THE WORKPLACE: PERSPECTIVES FROM HEALTH AND SAFETY REPRESENTATIVES

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Introduction Hot weather poses occupational health and safety concerns for outdoor workers or those in non-cooled indoor environments. The risk of occupational injuries increases during hot weather, however limited understanding exists on underlying factors associated with this increase in risk. While recommendations and guidelines for preventing heat-related health impacts include hydration, cooling practices, adequate ventilation and rescheduling work, the extent to which these recommendations are adopted in workplaces is currently unknown.

Methods A national online survey was conducted among health and safety representatives (HSRs) to better understand the nature of heat-related injuries. Responses relating to risk factors and preventive measures associated with reported injuries in workplaces were identified using log-poisson regression models.

Results In total, 222 HSRs completed the survey. Overall, more than a third (43%) of HSRs reported that injuries or incidents caused by hot/very humid weather occur sometimes/often in their workplace.

Factors found to be positively associated with reported injuries included 'the wearing of personal protective equipment (PPE)', 'inadequate resources and facilities' and 'new workers'.

For outdoor workers, the most frequently adopted preventive measures were provision of PPE, sunscreen and access to cool drinking water. HSRs reported more injuries if certain preventive measures (rescheduling work to cooler times and shaded rest/work areas) were adopted never/rarely/sometimes compared to often/always.

Access to cool drinking water and provision of PPE were the most frequently adopted preventive measures for indoor workers. For this group, HSRs reported more injuries if certain preventive measures (self-pacing, shielding of heat sources and adequate ventilation) were adopted never/rarely/sometimes.

Conclusion Findings indicate that organisational issues, workplace hazards, personal factors and preventive measures, are all determinants of heat-related injuries in Australian workplaces. Wider adoption of prevention measures such as work rescheduling, self-pacing, provision of shade and adequate ventilation could reduce incidence of heat-related injuries in outdoor and indoor workplaces.

08B.4 EXPLORING OCCUPATIONAL INJURY EXPERIENCES DURING HOT WEATHER: A NATIONAL SURVEY OF HEALTH AND SAFETY PROFESSIONALS

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Introduction Exposure to extreme heat can lead to adverse health effects and contribute to work-related injuries. However, there is limited understanding of how physical injuries arise in hot weather. A study of the perspectives of