Background A causal association between exposure to radon and its progeny and lung cancer is well established. However, a better knowledge on effect modification by time, age and exposure rate and on risk at low exposures or exposure rates is of high importance.

Method We analysed 58 974 male uranium miners of the German Wismut cohort with a mortality follow-up from 1946 to 2013 and a sub-cohort of 26 765 miners hired after 1960 characterised by radon values at low exposure-rates. Internal Poisson regression was applied to estimate the Excess Relative Risk (ERR) per unit of cumulative radon exposure in Working Level Months (WLM) with exponential time-related effect modifiers.

Results In the full cohort the crude ERR/WLM was 0.0019 (95% confidence interval (CI): 0.0017;0.0022) based on 3.947 lung cancer deaths. Age at median exposure, time since median exposure, and exposure-rate were strong effect modifiers. Taking them into account led to an estimate of 0.0067 (95%CI: 0.0052;0.0087) for an age at median exposure of 30 years, a time since median exposure of 20 years, and an exposure-rate of 3 WL (strong inverse exposure-rate effect). In the 1960+ sub-cohort, the crude ERR/WLM was 0.0111 (95%CI: 0.0064;0.0173) based on 495 lung cancer deaths. In this relatively young sub-cohort, time since median exposure was also a strong modifier, leading to an ERR/WLM of 0.0165 (95%CI: 0.0083;0.0247) at time since median exposure of 20 years.

Conclusion The present findings provide evidence for an increased lung cancer risk also at low exposures or exposure rates among miners.

Poster Presentation

Exposure Assessment

0240

MONITORING OF ASBESTOS FIBRE DISPERSION FROM A FACTORY TO SURROUNDING RESIDENTIAL ENVIRONMENT

^{1,3}Dongmug Kang*, ^{1,3}Youngki Kim, ^{1,2}Jongun Kim, ¹Hyunwoo Choi. ¹Dep. Occupational and Environmental Medicine, Pusan National University Yangsan Hospital, Yangsan, Gyeong-Nam, Republic of Korea; ²Environmental Health Centre for Asbestos, Pusan National University Yangsan Hospital, Yangsan, Gyeong-Nam, Republic of Korea; ³Preventive, Occupational and Environmental Medicine, Pusan National University, Yangsan, Gyeong-Nam, Republic of Korea

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Background Although many studies on occupational or environmental exposure levels of asbestos have been published, it is hard to find studies that checked asbestos levels of both of inside and outside of asbestos factory. This fact make epidemiologists connect occupational and environmental asbestos exposure and health outcome simultaneously. One large asbestos textile factory, which was moved from Japan around year 1970, moved from Korea into Indonesia around year 1990.

Methods The study was conducted during 26-28th August 2008 in Cibinong, Indonesia. The field survey was carried out to check current workers' and environmental exposure level of the factory that was moved from Korea. The observed asbestos environmental asbestos levels were compared with atmospheric dispersion models (AERMOD).

Results Inside of the factory, the highest airborne asbestos concentration was 86 times higher than the permit level 0.1fiber/cc. The working condition was similar with 80 s' of Korean working condition. Dispersion pattern of asbestos from a factory was related with wind direction. The correlation coefficient (r) and determination coefficient (r²) between air monitoring data and simulation data with AERMOD were 0.85 and 0.72 respectively.

Conclusion We confirm that asbestos workers in Indonesia had high exposure level of asbestos without proper protecting devices. Substantial level of environmental dispersion of asbestos from asbestos factory were found. This data can be used for basis of environmental exposure assessment for environmental asbestos related diseases. In addition, it is needed to transfer knowledge to protect hazards of asbestos with efforts to ban it to asbestos using countries.

Oral Presentation

Working Conditions

0241

RESULTS OF A SYSTEMATIC REVIEW ON THE EFFECTS OF CLIMATE CHANGE ON THE HEALTH AND PRODUCTIVITY OF WORKERS

Miriam Levi*, Alberto Baldasseroni. CRIMP – Regional Centre for Occupational Diseases and Injuries, Local Health Unit Tuscany Centre, Florence, Italy

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Introduction Climate change can impact on workers' health in different ways: the increase of ambient temperature can generate heat-related illnesses, cardiovascular, respiratory and kidney diseases; extreme weather conditions can cause traumatic injuries and acute deaths; the expansion of vectors habitat can cause the increase of vector-borne diseases. In addition, the reduced work capacity can result in a lower labour productivity. The aim of the systematic literature search we are conducting as part of the EU-funded Project HEAT-SHIELD is to explore the effects of climate change on the health and productivity of workers.

Methods Four separate search strategies were conducted. The first three were focused on the health impacts of, respectively, increased ambient temperatures, extreme weather conditions, expansion of vectors habitats; the fourth was aimed to assess the effect of climate change on labour productivity.

Results For each retrieved study, we are gathering specific information. From a preliminary assessment of the literature retrieved, the population more frequently studied is the working population as a whole, followed by miners and farm workers. The most studies health outcomes are heat-related illness, physiological parameters and workers hydration status (using urine specific gravity as a proxy).

Conclusions The results of our systematic reviews will be useful for policy makers to adequately plan and coordinate actions involving particularly the strategic industries targeted by the HEAT-SHIELD Project (manufacturing, construction, transportation, tourism and agriculture), and will therefore serve as a tool to prevent heat-related illnesses and promote labour productivity, innovation and implementation in the EU.