

Methods The search was done in Medline/EMBASE. The quality of selected papers was evaluated on the basis of the Newcastle-Ottawa Scale and the recommendations of the Cochrane Collaboration. Metaanalysis of the results of pulmonary function tests were evaluated separately for bio-persistent granular dust (BGD) and silica containing dust by random-effects models.

Results In cross-sectional analyses subjects occupationally exposed to BGD had on average a 160 ml lower FEV1 and the predicted value for FEV1 was decreased by 5.7%. The ratio of FEV1/FVC was also significantly decreased. Related to a cumulative BGS- exposure of 1 mg/m³·year FEV1 was decreased by 1.6 ml. The Odds Ratio for obstructive pulmonary test results (FEV1/FVC <70%) was 1.07 per 1 mg/m³ BGD at the workplace. Longitudinal analyses showed a yearly decline of FEV1 of 6.3 ml in BGD-exposed and of 11.8 ml in silica exposed persons compared to non/low-exposed persons in addition to age-dependent decline. A study of uranium miners (WISMUT Company) in Germany showed that the cumulative exposure to 1 mg/m³ pure respirable silica dust decreased the ratio of FEV1/FVC by 2.75%. The risk of COPD stage I increased (OR 1.81 pro 1" mg/m³·year) related to the exposure of pure respirable silica dust. In relation to COPD stage II + the cumulative doubling dose was 2 mg/m³·year pure respirable silica dust. All cited results were statistically significant (p < 0.01 to p < 0.001). Funnel plots did not indicate major publication bias.

Conclusion Review and metaanalysis showed a statistically positive association between the inhalative exposure to BGD at the workplace and a decreased FEV1 in cross-sectional as well as in longitudinal analyses.

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408 MEASURES OF METALWORKING FLUID EXPOSURE AND ITS RELATIONSHIP TO RESPIRATORY HEALTH IN MACHINISTS

¹E Peters, ²Arrandale, ¹Teschke, ³Turner, ⁴Chambers, ⁵McLean, ¹Karlen, ¹Kennedy. ¹University of British Columbia, Vancouver, Canada; ²Division of Preventive Medicine, University of Alberta, Edmonton, Canada; ³Faculty of Medicine, McGill University, Montreal, Canada; ⁴Faculty of Medicine, University of Ottawa, Ottawa, Canada; ⁵Faculty of Health Sciences, Simon Fraser University, Burnaby, Canada

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Objectives Our objective was to investigate the relationship between metalworking fluid (MWF) exposure and subsequent respiratory health among machinists in an inception cohort of apprentices.

Methods All first-year machinist apprentices at a provincial trade school were eligible to enrol (visit 1: 1988–1990). Subjects were retested during their 3rd year (visit 2: 1990–1992) and again 16 years after baseline (visit 3: 2004–2006). Interviewers collected information on respiratory symptoms and personal, work and exposure histories. Questionnaire responses were used to model average MWF exposure intensity for each job. Duration and cumulative MWF exposure were subsequently estimated. Pulmonary function and bronchial hyper-responsiveness (BHR) were also measured. Multiple linear regression models were constructed to investigate the relationship between MWF exposure and both % predicted forced expiratory volume in 1 second (% P-FEV1) and BHR at visit 3.

Results At visit 1, 99 machinist apprentices were enrolled. At visit 3, 77 (77%) machinists participated; all were men

(mean age 40.6 years). Machinists who had left the trade tended to have lower % P-FEV1 at visit 3 (p = 0.10) than current machinists and were more likely to have BHR (26% vs. 9%, p = 0.04). In regression models, leaving the machining trade was associated with lower % P - FEV1 at visit 3 (p = 0.005). Early MWF exposure was associated with lower % P - FEV1 at visit 3 (p = 0.02). In a separate model, current MWF exposure was associated with increased BHR (p = 0.05).

Conclusions Exposure to MWF was associated with % P-FEV1 and BHR at the 16 year follow-up. Early MWF exposure was associated with decreased % P-FEV1 and current exposure was associated with increased BHR. Machinists who left the trade had decreased % P-FEV1 and increased BHR at 16 year follow-up, demonstrating the strength of the healthy worker effect in this population and the need to account for this effect in studies of work-related respiratory disease.

409 THE USE OF AN AUTOPSY COMPENSATION DATABASE FOR SURVEILLANCE OF PULMONARY TUBERCULOSIS IN THE SOUTH AFRICAN MINING INDUSTRY: 1975–2011

¹N Nldovu, ²Park, ³Murray. ¹Naitonal Institute for Occupational Health, Johannesburg, South Africa; ²School of Public Health, University of Michigan, Ann Arbor, MI, United States of America; ³National Institute for Occupational Health, Johannesburg, South Africa

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Introduction Pulmonary tuberculosis (PTB) is a major public health problem in South Africa and gold miners have the highest incidence of tuberculosis in the world. However, there is no systematic surveillance of occupational lung diseases in the mining industry. South African law allows for autopsy examination for the diagnosis of occupational lung diseases, including PTB, regardless of the cause of death and with consent from the next of kin. Since 1975, the autopsy findings have been stored on a computerised database (PATHAUT). We estimated temporal trends in the relative proportions of PTB and evaluated their use for disease surveillance.

Methods We extracted data from PATHAUT on all autopsies from 1975 to 2011. The data were stratified by population group because of differences in the patterns of exposure, employment and autopsy referral. Long-term PTB trends and potential determinants of these trends such as age, gold mining service, duration of employment and year of death, were evaluated using linear regression.

Results The crude proportions of PTB were higher in black than white miners. The proportion of black miners with PTB increased from 0.03 in 1975 to 0.3 in 2011 and from 0.01 to 0.06 in white miners. Most of the miners with PTB (79.3%) had been exposed to silica dust in the gold mining industry. The increasing PTB trend was primarily due to year of death, increasing age and employment duration in the gold mining industry.

Conclusions The high and increasing trend of PTB in the South African mining industry is of great concern. Our findings will be discussed in the context of high HIV prevalence and silica dust levels in the mining industry. Initiatives to control the epidemic are underway and the autopsy database provides data that can be used for the surveillance of PTB and monitoring of preventative interventions.