American Journal of Industrial Medicine 16:281–287 (1989)

Mortality Among Employees of an Ontario Factory That Manufactured Construction Materials Using Chrysotile Asbestos and Coal Tar Pitch

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This paper describes mortality in a cohort of 324 men exposed to chrysotile asbestos and coal tar pitch used in the manufacture of electrical conduit pipe from a mixture of newsprint, bentonite, and asbestos. One death in a factory worker was attributed to pleural mesothelioma, and long-term employees experienced an increased risk of lung cancer (Standardized Mortality Ratio (SMR) 221; six deaths) and non-malignant respiratory disease (SMR 215; four deaths). In a case-control analysis, men whose jobs involved adding asbestos to the mix of raw materials were found to have a risk of lung cancer sevenfold higher (lower 95% confidence limit: 2.3) than men who had never worked at this job. Exposure to coal tar pitch is presumed to be responsible for the death of one worker from squamous cell carcinoma of the scrotum.

Key words: lung cancer, mesothelioma, cancer of the scrotum

INTRODUCTION

Studies of asbestos-exposed workforces have generally found that the risk of asbestos-associated diseases depends on the nature of the work activity and the variety of asbestos mineral used. As examples, the manufacture of friction materials containing chrysotile asbestos appears to carry relatively low risk [Berry and Newhouse, 1983], while the manufacture of crocidolite-containing gas masks was a very high-risk activity [Jones et al., 1980]. Regulatory authorities in Europe and Canada have responded to the apparent differences in the toxicity of the various asbestos minerals by adopting differing regulatory standards for them. As a result, the use of the amphibole minerals amosite and crocidolite has effectively been eliminated, and chrysotile asbestos has become the sole asbestos mineral of any importance in commerce.

The results of a mortality study of workers exposed to chrysotile asbestos in an Ontario manufacturing plant are presented here. This study came about because a former employee of the factory contacted The Royal Commission on Matters of Health and Safety Arising From the Use of Asbestos in Ontario to express the concern

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Accepted for publication February 23, 1989.

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TABLE II. Mortality Ratios According to Cause of Death, Length of Employment, and Time From First Employment in an Ontario Pipe Factory

		Years since first employment											
		10–19 years			20–29 years			≥30 years			Total ≥20		
Diagnosis	Length of employment	OBS	EXP	SMR	OBS	EXP	SMR	OBS	EXP	SMR	OBS	EXP	SMR
All causes	1–9 years	4	3.56	110	2	3.88	52	0	0.17	0	2	4.05	49
All causes	10 years or more	5	6.13	82	14	15.1	93	26	15.8	165	40	30.9	129
All cancer	1–9 years	0	0.78	0	0	1.05	0	0	0.05	0	0	1.1	0
All cancer	10 years or more	2	1.20	170	5	3.63	138	7	4.17	168	12	7.8	154
Lung cancer	1–9 years	0	0.25	0	0	0.38	0	0	0.02	0	0	0.40	0
Lung cancer	10 years or more	0	0.35	0	3	1.24	242	3	1.48	200	6	2.72	221
GI cancer	1–9 years	0	0.17	0	0	0.22	0	0	0.01	0	0	0.23	0
GI cancer	10 years or more	1	0.31	320	0	0.85	0	2	0.92	220	2	1.77	110
Respiratory Dis.	1–9 years	0	0.14	0	0	0.18	0	0	0.01	0	0	0.19	0
Respiratory Dis.	10 years or more	1	0.25	400	2	0.83	240	2	1.03	190	4	1.86	215
Ischemic heart	1–9 years	3	1.17	260	0	1.26	0	0	0.06	0	0	1.32	0
Ischemic heart	10 years or more	1	2.43	41	4	5.96	67	8	6.00	133	12	12.0	100

OBS, number observed; EXP, number expected. GI, cancer includes esophagus, stomach, and bowel ICD: 150–154, ninth revision. Respiratory diseases includes International Classification of Diseases (ICD): 480–519. Ischemic heart disease includes ICD: 410–414.

the attention of physicians. It was not possible to confirm the diagnosis because the pathologic material could not be located for review.

No deaths occurred during the period of follow-up among the men who had been employed for less than 1 year; three deaths would have been expected according to Ontario mortality rates.

The mortality pattern among the men who were employed 1 year or more is given in Table II, stratified according to time since first employment. Omitted from Table II are the three deaths that occurred in the cohort within 10 years of hire; two were due to non-occupational trauma, and one was due to tuberculosis.

The mortality pattern among the men who were employed less than 10 years is unremarkable. No deaths from cancer or respiratory disease were found 20 or more years after first employment, but this subcohort is so small that only one cancer death would have been expected.

The men who were employed 10 years or more were found to have elevated mortality rates from cancer and respiratory diseases. The period following 30 years from first employment saw substantial excess mortality, with deaths from cancer, respiratory disease, and ischemic heart disease contributing to the surplus. In addition, there were four traumatic deaths where 0.7 would have been expected.

Cigarette smoking is a major cause of both lung cancer and respiratory disease and thus is a potential confounder of the relationships between occupational exposures and disease. Smoking information was not generally available for the members of the cohort. A survey was carried out, in 1983, of individuals who were employed at the time of plant closing; 80 responses were obtained. Eighteen individuals, 23% of those replying, claimed never to have smoked. Eighty-six percent of the 37 men 45–64 years of age were or had been smokers, in comparison with a prevalence rate of 75% in the Ontario Labor force in 1983 [Department of National Health and Welfare, 1985].

disheartening that, 200 years after the first descriptions of scrotal cancers as occupational diseases, deaths are still occurring from this tumor.

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