

PROGRAM TO PREVENT ASBESTOS-INDUCED HEALTH HAZARDS IN FINLAND—ASBESTOS PROGRAM IN FINLAND

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The Institute of Occupational Health (IOH) started a program to prevent asbestos-induced hazards in 1987. Special emphasis is placed on primary and secondary prevention of asbestos-related cancers. The program involves the dissemination of information, training, services, and research. The IOH is carrying out the program together with the authorities, industry, unions, the health care system, and insurance companies. The program aims to prevent asbestos-related health hazards (by minimizing exposure to asbestos and by educating workers already exposed), to assess the risks caused by exposure to asbestos, and to improve the diagnosis of asbestos-related diseases in Finland.

EXPOSURE TO ASBESTOS IN FINLAND

The use of asbestos in new production was highest between 1965-1975 (about 12,000 tons annually). Some asbestos products are still produced, but the authorities have stipulated that the manufacture of all asbestos products should cease by 1995. This stipulation, however, does not mean that exposure to asbestos will cease, because asbestos is present in nearly all buildings, ships, etc. built before 1975-1980. More and more old buildings are being renovated. Potential asbestos sources have been assessed only in a few cases. Because of this insufficiently controlled, and on-going, situation, both direct and indirect exposure to asbestos has been more common than is generally realized. Besides occupational environments there are many non-occupational sources of asbestos exposure: refitting schools, hospitals, garrisons, and other public buildings. The goal is to stop using asbestos in new production and to assess the potential asbestos exposure before planning work to renovate old buildings. When asbestos is present, work should always be done so that neither workers nor the environment is exposed.

According to a rough estimate, there are more than 200,000 currently active or retired workers in Finland who have been exposed to over 2 fb/ml for a period of at least two months. Altogether some 50,000 workers (mainly from the construction industry) over 40 years of age have been working in the construction branch for more than 10 years. Thus, on the basis of what is known about the exposure situation in Finland, incidence of asbestos-related diseases will reach its peak during the first decade of the next century.

ASBESTOSIS

A total of about 550 asbestosis cases were diagnosed between 1938-1987. In the last few years, 30-40 cases of asbestosis have been diagnosed annually. Preliminary data from the screening of about 1,000 construction workers suggest that

there are many more undiagnosed asbestosis cases. The mean age of the surveyed groups was 59 years, and the workers had been employed in the construction branch in 1967. One in four screened construction workers had positive parenchymal and/or pleural findings; almost all of them were ignorant of their clinical status. When interviewed, they reported an average of 3.7 years of asbestos exposure. Half of them were retired. The routine health care system had been unable to trace the subjects for further clinical evaluation. It can be inferred that the number of undiagnosed cases of asbestosis is thus equal to or even higher than the number of diagnosed cases.

ASBESTOS AND CANCER

A large proportion of those who develop asbestosis will eventually die of cancer. Of the previously diagnosed Finnish asbestosis patients, about 40% have died of lung cancer, 5-10% of mesothelioma, and 10% of other cancers. At the IOH 130 asbestosis patients have been followed from 1980 to 1985. Eighteen of these 130 patients have contracted lung cancer within this observation period. The rough annual lung cancer incidence is thus 2.3/100.

About 2,000 incident lung cancers are found annually in Finland. Smoking is the most important etiological factor. The etiologic fraction of occupational exposures in the rise of lung cancer varies between 13% and 35%. Asbestos is the most important single occupational cause of lung cancer.^{5,6} In one study it was estimated that 23% of lung cancers could have been prevented by eliminating asbestos exposure.⁶

About 50 pleural mesothelioma cases are diagnosed in Finland each year. The number has tripled in the last 10-15 years. More than 80% of the diagnosed mesothelioma cases have been exposed to asbestos.¹² Only a few peritoneal mesotheliomas have been diagnosed in Finland.

TIME FACTORS IN ASBESTOS-INDUCED CANCER

The studies on asbestos insulation workers suggest that the risk of lung cancer may decline as the length of the observation period increases. In a cohort of 17,800 asbestos insulation workers, Selikoff et al¹¹ found that the relative risk of lung cancer begins to increase ten years from the first such employment, rises to a maximum at 30 to 40 years from the first employment, and then falls. A symmetrical bell-shaped curve with a peak at 35 years from the first employment is a good representation of this relationship.⁸ Asbestos and smoking increases the risk of lung cancer multiplicatively; asbestos increases the relative risk of lung cancer similarly among both smokers and nonsmokers.^{2,3,4}

Peto et al⁹ have shown that, among asbestos-exposed working, the mesothelioma death rates are proportional to the third and fourth power of time from the first exposure. This relationship occurs in a wide range of conditions of exposure and is independent of the worker's age when initially exposed. These findings suggest that asbestos induces mesothelioma by acting in the early stages of carcinogenesis, while asbestos induces lung cancer by acting in the late stages of carcinogenesis. This means that slight exposure at early age could have an important effect in inducing mesothelioma but a negligible effect in inducing lung cancer. In contrast, a high exposure level when middle-aged has an important effect in inducing lung cancer after a relatively short period which is approximately linearly proportional to the dose.

Time considerations may have an important bearing on calculations to determine the amount of asbestos-related malignant disease that can be expected to occur in the future. It may also be important with respect to chemoprevention, especially chemoprevention of lung cancer caused by asbestos.

CANCER CHEMOPREVENTION AMONG ASBESTOS-EXPOSED WORKERS

Vitamin A and beta-carotene (provitamin A) have attracted attention as possible cancer prevention agents.^{1,13} In retrospective epidemiological studies, subjects with low serum concentrations or low estimated dietary intakes of carotenoids, beta-carotene, or retinol have had an increased incidence of developing cancers as compared with matched cohorts having high to normal serum concentrations of these micronutrients.

Vitamin E is able to act as a radical trap in lipid membranes. Some experimental studies have suggested that vitamin E has an inhibitory effect on the development of tumors in experimental animals induced by chemical carcinogens. Relevant epidemiological studies are limited. In two cohort studies, no relationship was found between vitamin E levels and risk of cancer at all sites combined¹³ or for various sites.¹⁰ However, in two other cohorts, significantly lower vitamin E levels were observed among women¹⁴ and men⁷ who subsequently developed cancer than among their controls.

A prospective intervention trial involving administration of beta-carotene and vitamin E to asbestosis patients and subjects heavily exposed to asbestos is presently being planned. The aim is to determine whether daily treatment with beta-carotene (20 mg) and/or vitamin E (50 mg) could result in a lower incidence of (lung) cancer in groups receiving the active treatment as compared to the incidence in the group receiving a placebo.

DIAGNOSTICS AND COMPENSATION

Asbestos-related diseases, including malignancies, have been known for decades. According to the Finnish occupational health legislation, all those with asbestos-induced diseases are eligible for compensation. The information on occupational exposures should therefore be gathered for every mesothelioma and lung cancer patient. In every case the causal importance of asbestos should be evaluated from the medical point of view.

SUMMARY

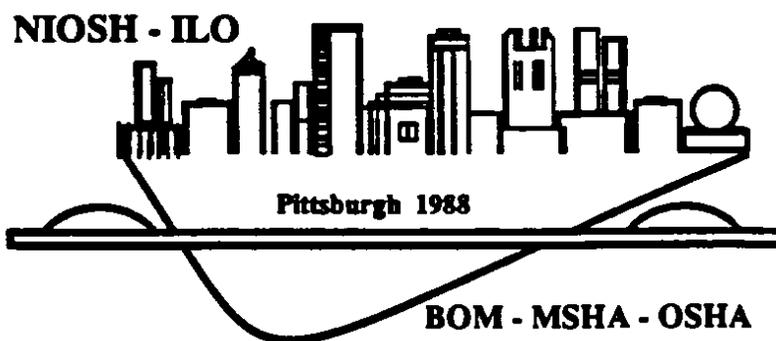
There is no known safe level of exposure to asbestos at work. Primary prevention is the main goal of the asbestos program of the IOH. Primary prevention carried out today can reduce the disease incidence in future decades. The present disease panorama is the consequence of past exposures (mainly before the 1970s). The peak in asbestos-induced diseases will be reached 15–20 years from now. The annual number of asbestos-related premature deaths is estimated at present to be about 150, which exceeds the annual number of fatal occupational accidents. The number of pleural mesotheliomas has tripled in the last 10–15 years, and is now about 50/year. Only in a few cases of mesothelioma has there been no relevant asbestos exposure. However, clinicians have paid very little attention to exposure to asbestos. Therefore most cases are not registered as occupational diseases, and no claims are filed with insurance companies. Informing and training hospital medical staff is essential to improve the situation. The termination of exposure, antismoking campaigns, improved diagnostics, and careful attention to compensation issues, as well as clarifying the potential for chemoprevention, are the central points of the asbestos program of the IOH.

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