Occupational respiratory diseases due to asbestos

Summary

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Introduction

Asbestos has a long and successful history as a powerful industrial material. Unfortunately this is accompanied by very significant dangers to the workers' health. Asbestosis, lung cancer, mesothelioma, and laryngeal cancer have been proved to be caused by asbestos exposure. The main factors responsible for this are the geometric shape of the fibres and their biopersistance. There is no significant difference between the thin and curvilinear chrysotile variant and its straight species like e.g. crocidolite and amosite with respect to their carcinogenic effect.

In Germany the first measures of primary prevention (however insufficient they may look like from a modern point of view) have been issued in the first half of the twentieth century. Asbestosis was recognized as an industrial disease in 1936 and lung cancer from asbestos exposure in 1943. The ban of asbestos products was initiated in 1979 with the explicit mentioning of sprayed asbestos.

Diseases

Asbestosis is caused by a prolonged exposure towards significant asbestos fibre concentrations. Lung cancer due to asbestos exposure also needs a significant fibre dose to be developed. Therefore in Germany a patient will be compensated if a high enough dose of asbestos fibres was taken up in the workplace. This is assumed to always be the case for patients suffering from asbestosis AND lung cancer ("bridging symptom"). When asbestosis has not been developed, the dose taken up in the workplace must be investigated independently. For this purpose a special tool has been prepared in Germany: the "Fibre-year-model". Lung cancer from asbestos exposure in the workplace will be compensated if the patient was exposed to 25 fibre years or more in the workplace with 1 fibre year being equivalent to 1 fibre per cm³ per year (shift exposure). So a daily exposure of 1 F/cm³ over the period of 25 years will be sufficient. The same would be true for a daily exposure of 2.5 F/cm³ over 10 years. The German Berufsgenossenschaften (BGs) have developed a list

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of "typical" shift concentrations for specific workplaces. It can be used for the most important exposure types and is continuously expanded.

For mesothelioma there is not threshold limit dose in German legislation. A single occupational exposure together with the specific diagnosis is sufficient for compensation.

Compared to these diseases laryngeal cancer due to asbestos exposure has been introduced into the list of industrial diseases only in 1997.

**Effects**

Besides the individual suffering the diseases cause to the patients with virtually no possibility of cure especially for mesothelioma and lung cancer, asbestos has caused and continues to cause enormous economical damage. Some numbers from German experience: In 2003 more than 1,000 cases of death from asbestos (1,068) were recorded, after 899 in 1995 and 957 in 2000. And the peak to this development has not been reached. Due to the long latency period between exposure and the outbreak of the diseases it lies still in the future. An estimation of 30 years of latency or more together with a gradual decline of asbestos (ab)use starting in about 1980 in West Germany leads to the hope that only starting from about 2010 to 2015 a gradual decline of asbestos related diseases can be expected. The economic effects are also dramatic. In 2003 the annual costs due to asbestos exposure were estimated to be over EUR314 million in Germany alone. The increase from 1999 to 2004 was well above 40 per cent. The complete ban of asbestos products in Germany in the year 1993 can only be regarded as well justified and should be implemented worldwide.

Similar international experience exists in France where the costs of asbestos related disease in the years between 2000 and 2020 are estimated at EUR37 billion, and in the United States, where already more than 20 companies could no longer serve the compensation costs and went into bankruptcy.

**Preventive strategies**

Primary prevention in Germany currently concentrates on the still numerous workplaces were asbestos products have to be removed from buildings or industrial facilities. Because of the indicated danger of even low exposure concentrations with respect to mesothelioma generation, very high demands are to be formulated for personal protection. This is described in a Technical Standard in Germany (TRGS 519). The most important measure in Germany has been taken in the field of secondary prevention. The medical investigation of formerly asbestos exposed workers is organized centrally in the ZAS (Central Registration Agency for Employees Exposed to Asbestos Dust). In 2003 about 480,000 persons were registered in the data base. About 62,000 of them were still exposed at that time and about 230,000 had been in the past. The ZAS invites the formerly exposed workers to regular medical investigation on a volunteer base. The service has a high degree of acceptance. Currently novel models are developed to enhance the specificity of the invitation by identifying high risk cohorts within the total number of registered persons in order to be more cost efficient but also to decrease the personal stress for low risk former workers.

**Conclusion**

The story of asbestos is a long and harmful one. Even now the peak of industrial diseases caused by it is not reached in Germany after thirteen years of a complete ban of asbestos
products. The diagnosis of lung cancer or mesothelioma is still almost identical to a death warrant as no cure for these diseases has been developed. Asbestosis is combined with a very significant decrease in quality of life.

The economic burden for society caused by asbestos is enormous.

Only a complete ban of the material can solve the problems at some time in the future.

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