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LETTER TO THE EDITOR

Chrysotile Asbestos and Mesothelioma

Key words: brake repair exposures, lung dust analysis, case-control study

With great interest, we have followed discussions of the mesothelioma potential of chrysotile which followed Dunnigan's proposal that this was very limited indeed [Dunningan, 1988; Craighead, 1988; Roggli and Pott, 1988; McDonald, 1988]. We have been investigating this question in several ways: measurement of asbestos in work sites; analysis of asbestos fiber lung burden among persons exposed to asbestos; and clinical study of asbestos-related occupational cancer in our outpatient clinic.

First, as others, we have found a marked disparity between extensive exposure to chrysotile at the workplace and the lack of an increased concentration of chrysotile fibers in lung dust specimens of individual patients [Woitowitz et al., 1966; Manke et al., 1987; Rodelsperger et al., 1990a,b). Thus, like McDonald [1988], Roggli and Pott [1988], and Churg [1988], we do not exclude a long-term cancer effect, with mesothelioma, despite the absence of high concentrations of chrysotile fibers in lung dust at autopsy 30 years later, with the possibility of a "hit-and-run" phenomenon. Roggli and Churg point to this phenomenon, particularly for the fibrogenic effect of chrysotile. This phenomenon may also explain the effects of other carcinogenic agents, e.g., polycyclic aromatic hydrocarbon (PAH) or tar, which cannot be detected in lung tissue of patients who die of bronchial carcinoma, as well as lung cancer caused by cigarette smoke.

The application of this phenomenon needs to be discussed separately with regard to carcinogenesis of mesothelioma and bronchial carcinoma, as suggested by the epidemiological investigations of McDonald et al. [1983a,b]. An observation of Bellmann et al. [1987], who showed a more than tenfold increase in the number of chrysotile fibers in tissues (with splitting of fibers), 2 years after intratracheal injection in rats, may be of interest in this regard. In comparison, the number of crocidolite fibers remained constant. The number of man-made inorganic fibers decreased. Parenthetically, we find Churg's opinion [1988], that mesotheliomas are only induced by extremely high dosages of chrysotile, surprising.

Conclusions from experiences in the mining and milling industry cannot be transferred to other workplaces with high concentrations of chrysotile fibers, where, unlike reports from mining centers, there is an abundance of mesotheliomas. An example of this is experience with car mechanics in the Federal Republic of Germany.

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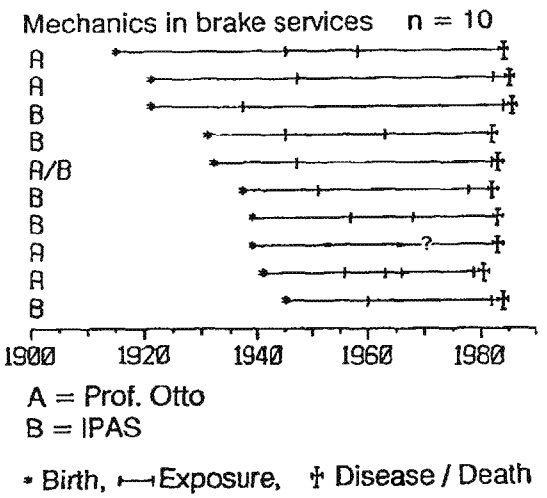

Fig. 1. Observation of mesothelioma caused by chrysotile. In one mechanic (date of birth, 1939) solely the duration of exposure could be determined, but not the year of initial exposure.

In our outpatient clinic (IPAS) and in the files of Professor Dr. Otto [1984], we found 10 mechanics who serviced brakes on motor vehicles, and who developed mesotheliomas between 1980 and 1985 (Fig. 1) [Rödelsperger et al., 1988]. The problem is potentially an important one for Germany due to the increase in motor vehicle use since WW II; there are now perhaps 250,000 employees at this work.

Our studies demonstrated low exposure to asbestos among auto mechanics. It was exclusively chrysotile. The mean concentration of fibers (L = >5μm) (90 measurements in 76 garages) was analyzed among 210 car mechanics with a working history of $x \pm s = 21 \pm 10$ years, amounting to $x \pm s = 0.54 \pm 1.1$ fibers/ml × years [Rödelsperger et al., 1986]. Chrysotile was found using transmission electron microscopy and infrared spectrography. Manufacturers of friction materials confirmed the exclusive use of chrysotile [Doussier, 1988]. The German Institute of Occupational Safety, in studies requested by the employees' liability insurance association, found chrysotile in 611 of 615 samples of respirable dust in the friction lining industry, whereas crocidolite was discovered only four times in a single plant between 1981–1982 [Coenen and Schenk, 1984]. In garages, only chrysotile was found (338 measurements).

In our clinic, of a total of 174 mesothelioma patients, the number of car mechanics increased from six to 12 during the period. Additional data are expected from a multicenter case-control study directed by our Institute. Our data indicated there were 14 car mechanics among 175 patients suffering from mesothelioma in hospitals in Hamburg and Munich since the start of the new study in 1988. In at least three patients, occupational exposure to asbestos fibers in car mechanic work was the only known exposure to asbestos. The 11 other patients started work as car mechanics, but later they worked as fitters for turbines, mechanics in the shipbuilding industry, riggers, welders, or other trades with the potential for exposure to asbestos.

In summary, we have found an increased incidence of mesothelioma among car mechanics exposed only to chrysotile, with a mean dose of <1 fiber/ml × years. We expect that analysis of fibers in lung tissue of these patients will provide further data.

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