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LETTER TO THE EDITOR

Chrysotile Asbestos, Mesothelioma, and Garage Mechanics

Key words: case reports, brake lining exposures, fiber dimensions, forsterite, asbestos

Drs. Woitowitz and Rödelsperger [1991] commented on the series of articles on the relationship between exposure to chrysotile and mesothelioma published in the Journal in 1988. They also reported some cases of mesothelioma patients at their clinic, who had worked at one time as garage mechanics. Their conclusion was that they "have found an increased incidence of mesothelioma among car mechanics exposed only to chrysotile, with a mean dose of <1 fiber/ml-years." This conclusion was not in agreement with the general consensus expressed by the authors of the 1988 series of articles that either chrysotile has little or no mesothelioma-producing potential [Dunnigan, 1988; Craighead, 1988; McDonald, 1988], or only extremely large doses of chrysotile can produce mesothelioma in man [Churg, 1988]. Furthermore, the conclusion reached by Drs. Woitowitz and Rödelsperger was not justified by the data they presented.

What Drs. Woitowitz and Rödelsperger presented was *not* an epidemiologic study. Although one of the key words listed by the authors in the report was "case-control study," the report was definitely not a case-control study. The best characterization of the data is that of a "case report." There were no controls mentioned in the report. Furthermore, there was no estimate of relative risk of mesothelioma in garage mechanics.

The authors reported that among mesothelioma patients at their clinic, 14 had worked at one time as garage mechanics. However, in only three cases was there no other occupational exposure to asbestos. In the remaining 11, the patients had also worked as fitters for turbines, mechanics in the shipbuilding industry, riggers, welders, or in other trades with asbestos exposure. Thus, with respect to potential exposure to brake-lining dust alone, only three cases should be counted.

The observation of three or a few cases of mesothelioma in garage mechanics with some minimal chrysotile exposure does not demonstrate an increased risk of mesothelioma in garage mechanics in general, just as we cannot conclude that the use of hair driers increases mesothelioma risk based on an observation of a few cases of mesothelioma among persons who used hair driers. Although mesothelioma is a rare

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disease, there is a background rate of mesothelioma in the general population without any occupational exposure to asbestos. Similarly, there are numerous reports documenting that not all mesothelioma patients had occupational exposures to asbestos. Some garage mechanics, simply being part of the general population, will develop mesothelioma even if they have no exposure to brake-lining dust.

In their report, Drs. Woitowitz and Rödelsperger mentioned that there are currently about 250,000 garage mechanics in Germany. The number will likely be several times larger if former garage mechanics are included. Since the reported cases included both active and former garage mechanics and the case ascertainment extended over several years, it does not seem obvious that three cases of mesothelioma would represent a significant excess over the background rate. However, a proper assessment requires information on the number of mechanics, their ages, and the duration of observation.

In other words, properly designed epidemiologic studies are needed to assess the relationship between exposure to brake lining dust and mesothelioma risk. Several epidemiologic studies have provided data on this issue. In one of the largest case-control studies of mesothelioma in North America, McDonald and McDonald [1980] examined the employment histories of 480 cases and their matched controls. Eleven (11) cases and 12 controls were found to have worked as garage mechanics. (Based on these figures, an approximate relative risk is estimated to be 0.9). In their 1980 report, McDonald and McDonald concluded that there was no excess of mesothelioma in garage mechanics. Later in 1986, McDonald and McDonald stated in an excellent review article on mesothelioma that "no increased risk was found for garage work" [McDonald and McDonald, 1987].

The relationship between occupational exposures and mesothelioma patients in Connecticut, 1955–1977, was examined in a case-control study conducted by the Connecticut Tumor Registry [Teta et al., 1983]. Included in the study were 220 cases of mesothelioma. The authors reported a relative risk (RR) of 0.65 for "automobile repair and related service" (based on six cases). In another case-control study, the epidemiologists at the National Cancer Institute compared occupational exposures between mesothelioma cases and their matched controls [Spirtas et al., 1985]. Included in the study were 259 cases from Los Angeles and New York State, 1975–1980. The RR reported for "brake lining installation and repair" was 1.0, with a 95% confidence interval of 0.6–1.6. Finally, in a smaller case-control study in Louisiana, Schiffman et al. [1988] reported that none of the 37 mesothelioma cases had worked as a mechanic, but there were two mechanics among the controls.

Thus, epidemiologic data consistently and convincingly demonstrate that garage mechanics are not at an increased risk of mesothelioma. The suggestion of an increased risk based on a case report in the presence of opposing epidemiologic data is not justified.

In addition to epidemiologic data, there are also physical as well as biological reasons why garage mechanics are not at an increased risk of mesothelioma. First, the type of fiber used in brake lining is chrysotile, which has little or no mesothelioma-producing potential. Second, during the braking process, the temperature in the brake shoes reaches 600–800°C. At that temperature, almost all chrysotile fibers are transformed into forsterite, which is neither asbestos nor even fibrous. Third, based on industrial hygiene measurements, the typical 8-hr time-weighted average fiber concentration in a garage is less than 0.05 fiber/cc [Kauppinen and Korhonen, 1987;

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Rödelsperger et al., 1986; Cheng and O'Kelly, 1986]. These industrial hygiene surveys also indicate that almost all fibers detected are less than 2–3 μm, with less than 1% longer than 5 μm.

Therefore, based on a consideration of fiber type, physical transformation, fiber length, and fiber concentration, exposure to brake-lining dust should not increase mesothelioma risk among garage mechanics. Most importantly, as discussed above, opposing epidemiologic data have consistently demonstrated that garage mechanics are not at an increased risk. In the presence of epidemiologic data, I do no think that case reports such as the one by Drs. Woitowitz and Rödelsperger are very helpful in determining the relationship between brake-lining dust exposure and mesothelioma risk.

Otto Wong, SCD, FACE
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REFERENCES

Cheng VKI, O'Kelly FJ (1986): Asbestos exposure in the motor vehicle repair and serving industry in Hong Kong. J Soc Occup Med 36:104–106.

Churg A (1988): Reply to Dr. Dunnigan (Letter to the editor). Am J Ind Med 14:235–238.

Craighead JM (1988): Response to Dr. Dunnigan's commentary (Letter to the editor). Am J Ind Med 14:241–243.

Dunnigan J (1988): Linking chrysotile asbestos to mesothelioma. Am J Ind Med 14:205–209.

Kauppinen T, Korhonen K (1987): Exposure to asbestos during brake maintenance of automobile vehicle by different methods. Am Ind Hyg Assoc J 48:488–504.

McDonald JC (1988): Tremolite, other amphiboles, and mesothelioma (letter to the editor). Am J Ind Med 14:247–249.

McDonald AD, McDonald JC (1980): Malignant mesothelioma in North America. Cancer 46:1650–1656.

McDonald AD, McDonald JC (1987): Epidemiology of malignant mesothelioma. In Antman K, Aisner J (eds): "Asbestos-Related Malignancy." London: Grune & Stratton Inc., pp. 31–55.

Rödelsperger K, Jahn H, Bruckel B, Manke J, Paur R, Woitowitz HJ (1986): Asbestos dust exposure during brake repair. Am J Ind Med 10:63–72.

Schiffman MH, Pickle LW, Fontham E, Zahm SH, Falk R, Mele J, Correa P, Fraumeni JF (1988): Case-control study of diet and mesothelioma in Louisiana. Cancer Res 48:2911–2915.

Spirtas R, Keehn R, Wright W, Stark A, Beebe G, Dickson E (1985): Mesothelioma risk related to occupational or other asbestos exposure: preliminary results from a case-control study. Am J Epidemiol 122:518.

Teta MJ, Lewinsohn HC, Meigs JW, Vidone RA, Mowad LZ, Flannery JT (1983): Mesothelioma in Connecticut, 1955–1977: occupational and geographic associations. J Occup Med 25:749–756.

Woitowitz HJ, Rödelsperger K (1991): Chrysotile asbestos and mesothelioma (Letter to the editor). Am J Ind Med 19:551–553.

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