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Letter to the Editor re: Evaluation of the size and type of free particulates collected from unused asbestos-containing brake components as related to potential for respirability.

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Abstract

We are writing in response to the recent article by Atkinson et al. regarding potential asbestos exposures associated with unused brake components [Atkinson et al., 2004]. In that study, rinsates of unused brake components were analyzed by transmission electron microscopy (TEM) for the presence of asbestos fibers. We do not believe that the findings of Atkinson et al. are informative and could have been predicted based on the study design and the fact that one would expect to find measurable TEM asbestos fibers on an unused brake component. We also find that the paper did not provide a full or even partial discussion of the published literature with respect to industrial hygiene or epidemiology data. The findings of Atkinson et al. do not, in our view, "further raise concerns" about historical asbestos exposures experienced by automotive mechanics because of the vast amount of published literature to the contrary.

Keywords: asbestos, brake mechanics, dust, electron microscopy, epidemiology, exposure, phase contrast microscopy

To the Editor:

We are writing in response to the recent article by Atkinson et al. regarding potential asbestos exposures associated with unused brake components [Atkinson et al., 2004]. In that study, rinsates of unused brake components were analyzed by transmission electron microscopy (TEM) for the presence of asbestos fibers. The authors indicate that they detected the presence of free asbestos fibers that "theoretically" would not have been detected using the standard National Institute of Occupational Safety and Health (NIOSH) analytical techniques, which employ phase contrast microscopy (PCM). The authors then conclude that this "further raises concern" about "individuals occupationally exposed to work environments where these [brake] components are used."

We take issue with the authors' methods and conclusions for several reasons. First, while the question of PCM vs. TEM as the most appropriate or accurate analysis for measuring airborne asbestos levels associated with brake components may be interesting from an academic perspective, it is completely irrelevant to the issue of whether automotive mechanics, or persons in any other occupation, are at increased risk of developing an asbestos-related disease as a result of handling friction products. Atkinson et al. fail to discuss or even mention the fact that more than 20 epidemiology studies involving automotive repair workers have been published in the last 30 years, none of which detected an increased incidence of asbestosis, lung cancer, mesothelioma, or any other asbestos-related respiratory disease [Paustenbach et al., 2004; Goodman et al., 2004]. Indeed, no published epidemiology study of automobile mechanics supports an increase in any asbestos-related disease. As discussed in our recent paper, the lack of asbestos-related diseases in this occupation is due largely to the well-documented fact that the

long-term (e.g., 8-hour time-weighted-average) airborne levels of asbestos in automotive service facilities, where brake components are often handled extensively, are very low and, in some cases, non-detectable [Paustenbach et al., 2003]. In short, we believe that the detection of asbestos fibers in the rinsate of brake components "raises concern" only for those who are unfamiliar with the vast body of relevant epidemiological and industrial hygiene literature to the contrary.

The methodology reported in Atkinson et al. also raises several questions regarding the validity of the findings. It is well known that asbestos fibers are naturally occurring and ubiquitous in environmental media, including ambient air and tap water [Nicholson et al., 1980; Rowe, 1983]. It is therefore curious that Atkinson et al. did not follow standard scientific methods and include analyses of a "control" rinsate that did not come in contact with brake components. In addition, the authors make several assumptions regarding the comparative results that "theoretically" might have been obtained using PCM instead of TEM. The authors conclude that PCM would likely have failed to detect many of the fibers that were measured using TEM, because the TEM method measures asbestos fibers of all lengths and widths, while the PCM method measures fiber lengths of 5 microns or greater. This is conjecture on the authors' part and underscores a major flaw in the study design. Rather than using TEM methods alone and then theorizing as to what the PCM results might have been, it would have been far more informative to analyze samples contemporaneously by both methods. We would point out that NIOSH conducted such comparative analyses in service garages in the 1970s and found that, in many cases, the PCM measurements were actually higher than the TEM measurements (because PCM measures all fibers, while TEM measures only asbestos fibers) [Johnson et al., 1979].

Finally, there is the obvious question of relevance. The authors fail to make any connection between the presence of rinsate fibers and actual airborne concentrations of asbestos. The fact that some asbestos fibers are expected to be present on unused brake components (which are at least 30% asbestos by weight) renders the findings of Atkinson et al. fairly uninformative and completely predictable. Further, it is reasonable to expect that airborne fibers associated with the handling of unused brake components were captured in the hundreds of air samples for brake mechanics collected by NIOSH in the 1970s and 1980s in U.S. service garages. As described in our paper [Paustenbach et al., 2003], the vast majority of the long-term samples in these studies contained asbestos at levels below the current Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) of 0.1 f/cc.

There are also instances where the authors chose to cite the published literature in a highly selective manner that does not provide a full context to the reader. For example, Atkinson et al. note that Butnor et al. reported the presence of chrysotile fibers in the lung tissues of mesothelioma patients wherein "brake dust was the sole recognized source of asbestos exposure" [Butnor et al., 2004]. But they fail to acknowledge the conclusion of Butnor et al. that "friction product exposure, such as that encountered by automobile mechanics, is unlikely to contribute to the development of MM [malignant mesothelioma]."

In summary, we do not believe that the findings of Atkinson et al. were informative and could have been predicted based on the study design and the fact that one would expect to find measurable TEM asbestos fibers on an unused brake component. We also find that the paper did not provide a full or even partial discussion of the published literature with respect to industrial hygiene or epidemiology data. The findings of Atkinson et al. do not, in our view, "further raise

concerns" about historical asbestos exposures experienced by automotive mechanics because of the vast amount of published literature to the contrary.

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