

The Hazards of Asbestos for Brake Mechanics

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ASBESTOS is the generic name of a group of hydrated magnesium silicate mineral fibers. There are two groups of these minerals—serpentine (chrysotile) and amphibole (amosite, crocidolite, anthophyllite, tremolite, and actinolite). Ninety-five percent of the world's asbestos production is chrysotile.

Reports of epidemiologic and pathological studies (1-4) reveal that occupational exposure to commercial asbestos minerals enhances the likelihood of a number of diseases—asbestosis and cancers of the lung, pleura, peritoneum, larynx, and gastrointestinal tract. The time from onset of exposure to the time of clinically apparent disease is usually more than 20 years. Cancer from asbestos is not limited to workers who handle the material. There are also reports of pleural and peritoneal mesothelioma (tumors rarely seen in the general population) in persons with family, or neighborhood, or indirect occupational exposure to asbestos (4-7).

Mesothelioma was the cause of death of a man who had regularly sanded vinyl asbestos floor tile (8). Under simulated conditions of this man's work, a maximum asbestos dust concentration of 1.3 fibers per ml (fibers longer than 5 microns) was found in air samples passed through membrane filters worn by a person sanding vinyl asbestos (8). The type of asbestos now used in domestic floor tile is chrysotile—the same as that used in brake friction materials, according to the Asbestos Information Association. A case of mesothelioma in a brake mechanic has been reported (9).

Commercial friction materials used in the United States for braking passenger cars and trucks contain an average composition of 50 percent chrysotile by weight (10). Asbestos has been used for brake drum linings,

disk pads, and clutch facings for the past 50 years. Jacko and DuCharme (11) estimated that the United States annually uses 103 million pounds of asbestos for brake friction materials and 4.5 million pounds in automotive clutch friction materials.

In 1968 Lynch reported that because of the heat of friction caused by braking, almost all of the asbestos in brake linings is transformed to a nonfibrous mineral, and a small fraction of asbestos escapes as free fiber (12). Jacko and co-workers determined that vehicles in this country emit 158,000 pounds of asbestos per year, of which 11.2 percent is retained in the brake and disposed of during service (13).

Brake mechanics have low and intermittent exposure to asbestos. This exposure has been reported to be 0.79 fiber per ml time-weighted average (fibers longer than 5 microns), with peaks up to 7 fibers per ml when brake parts are being cleaned (14). The standard method for removing dust from brake parts is to blow it out with a

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foot of air to 2 fibers per ml (fibers longer than 5 microns). For asbestos textile plants, this reduction is about 15-fold (22). Present and scheduled standards claim only to protect workers against asbestosis, the disease for which the dose-response relationship is most quantitatively known. The British standards for chrysotile and amosite asbestos, which are comparable to the asbestos standard scheduled to take effect in the United States in 1976, do not purport to provide protection against increased risk of cancer (23,24).

Previously studied cohorts of asbestos workers were exposed to time-averaged concentrations greater than 2 fibers per ml (fibers longer than 5 microns). Current studies of cohorts with time-averaged exposure on the order of 1 fiber per ml (greater than 5 microns in length) may provide evidence of hazard at that level. In view of alarming preliminary findings of pulmonary fibrosis in such a cohort, the National Institute of Occupational Safety and Health has suggested to the Department of Labor that consideration be given to further lowering of the asbestos standard (25).

The average brake mechanic is not aware of the potential hazard of airborne brake dust. Nor is he quick to change time-hardened habits when warned of dangers if he cannot feel their effects. Nonetheless, substantial reduction in asbestos exposures during brake repair can be achieved by simple changes in technique, with the use of equipment already available in most brake service establishments.

In view of the tendency of the accumulating literature to reveal cancer induction from asbestos at progressively lower levels of exposure, mechanics should be advised not to blow out brake parts and to use instead methods which create less airborne dust. The manufacturers of automotive friction materials could easily attach a clear hazard warning to every item sold.

The limited success of both the Baltimore and Washington studies shows the limited efficacy of voluntary compliance with health warnings—the shop managers and the mechanics simply do not have the same regard for a warning that they have for a regulation. The margin of safety, if any, provided by the current asbestos standards has been sharply criticized as insufficient (26). While it is advisable that brake mechanics at least be warned of the potential hazard of their work, it is also apparent that blowing out brakes will be a common practice so long as health regulations permit it.

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