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Commentary

Assessment of Studies on Cancer Risks from Asbestos in Connecticut Drinking Water

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Two related studies were conducted in Connecticut to try to assess cancer risks from asbestos in Connecticut public drinking water (*1–3*). Eleven of the state's 169 towns used source waters containing small amounts of asbestos (less than 500,000 fibers/L as delivered to users). In 82 towns, some, but rarely all, of the population received in their homes water delivered through asbestos cement (AC) pipe located in some part(s) of the distribution systems. The total population potentially exposed on a regular basis to such waters was about 600,000, approximately 20% of the state's population. The average possible duration of exposure was about 20 yr but ranged from over 30 to less than 5 yr.

The published studies were correlational. They considered rates for all cancers, including those of the stomach, colon, rectum, pancreas, lungs, urinary bladder, and kidneys. There was no information about residential mobility or possible occupational exposures of persons who were reported to the Connecticut Tumor Registry (CTR) with newly diagnosed cancers. The U.S. EPA report listed individual cases of peritoneal mesothelioma by town of residence at diagnosis. Possible occupational exposures were explored by searching through city directories. No interviews were conducted for either study.

No consistent evidence of a cancer risk from asbestos in water was suggested in any of the Connecticut work. In comparison with correlational studies from other areas, possible exposures of Connecticut residents to asbestos were quite low, generally only a few hundred thousand fibers per liter as compared with 50 million or more in the water supplies of both San Francisco and Everett, Washington. The second Connecticut study (*2*) should have detected a 50% increased risk in total cancer rates in towns with the highest reported asbestos levels versus those with the lowest ($\alpha = 0.05$, $\beta = 0.90$).

The review of peritoneal mesothelioma gave no indication of a relationship with asbestos in water. A study in progress of all mesotheliomas reported to CTR from 1955 to 1977 indicates that occupational exposures, probably largely to chrysotile, have caused pleural, but rarely peritoneal, localization of this disease. Occupational exposure is suggested in 85% of all cases among men. The study provides circumstantial evidence that causes other than asbestos have probably been important determinants of peritoneal and other nonpleural mesotheliomas (*4*). This comprehensive review of Connecticut's mesothelioma experience is consistent with the negative findings of our correlational studies on possible effects of AC pipe on cancer rates (*1–3*).

The collaborators for these studies included water supply and water quality specialists from the State Department of Health Services and U.S. EPA, and the staff of the CTR and the Department of Epidemiology and Public Health at Yale University. The first work also involved the Centers for Disease Control of the U.S. Department of Health and Human Services. There was general agreement among the authors that although asbestos, as found in Connecticut drinking waters, could never be assumed or proven to be absolutely safe, there was no reason to change "current water distribution policies for Connecticut water supplies because of A/C pipe use"(*2*).

The foregoing conclusions were based on several considerations emphasized in discussions with water supply and water quality specialists, but not included in the report. These were as follows. In many cases, potable drinking water from public supplies is a specialized chemical product and will probably be controlled chemically in the future within even narrower limits than at present. These chemical controls are dic-

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tated by the primary requirement that communicable disease agents be excluded from or brought within acceptable limits in water delivered to users. The controls must also deal with possible corrosive effects of the water on both public piping systems and the systems existing in the homes of users. Third, the leaching of asbestos fibers from AC pipe into potable water supplies can be controlled completely by proper practices. Asbestos fibers occurring naturally in source waters can be reduced by filtration to less than 1% of their original levels.

All treatment systems and all piping systems have the potential for introducing undesirable or hazardous substances into potable water supplies. Some of these are either suspected or known carcinogens. Chlorination may produce trihalomethanes. Asbestos could eventually be shown to be carcinogenic in water supplies despite the lack of satisfactory current evidence. Aromatic hydrocarbons used for coating steel pipe are known to be carcinogenic, although quantities released into potable water are extremely small.

In view of the foregoing considerations, the water supply and water quality specialists who collaborated in the Connecticut studies believed that proper control of drinking water quality would offer the most effective strategy to deal with the potential health risks known or suspected in potable water supplies.

Data reported at the U.S. EPA Workshop on October 13 and 14, 1982, appeared to corroborate the conclusions reached in Connecticut, with the single exception of the ecologic study in the San Francisco area. Further statistical analyses of those data presented at the workshop suggested possible nonasbestos-related explanations for the original findings. The case-control study of cancer in relation to asbestos in water in the Seattle-Everett, Washington, area gave the most powerful epidemiologic evidence reported thus far that human cancers have not been shown to be related to asbestos in drinking water. The 100-fold greater asbestos-in-water exposures of residents of Everett compared with those in Connecticut would make it extremely unlikely that measurable numbers of cancers could have been detected in Connecticut, even if future work identifies a cancer risk from asbestos in drinking water.

It appeared that the most important information gap is in methods for measuring asbestos quickly, accurately, and relatively inexpensively in water as well as in air and foods. Suggestions were made for such methods. Epidemiologic studies of asbestos alone should probably not be planned. However, a comprehensive case-control study that considers trihalomethanes and other organic and inorganic materials, as well as asbestos, should be conducted in areas with adequate historical data about water supplies.

The views and policies presented by the author in this commentary do not necessarily reflect those of the U.S. Environmental Protection Agency. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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