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Community asbestos exposure in Globe, Arizona

Roy Ing, M.D.,* Henry Falk, M.D., *Atlanta, Ga.,* **Richard A. Lemen, Ph.D., George Carson, Ph.D.,** *Cincinnati, Ohio,* **Alexander Kelter, M.D., James Sarn, M.D.,** *Phoenix, Ariz.,* **and Michael Gray, M.D.,** *Tucson, Ariz.*

ASBESTOS, a fibrogenic and carcinogenic mineral, causes asbestosis, mesothelioma, and lung cancer. Environmental asbestos exposure is not unique to the industrial worker, and asbestos-associated abnormalities, such as pleural thickening, calcifications, and plaques, have been demonstrated in nonoccupationally exposed persons.[1] We describe here a small community in which the residents, including young children, have been unknowingly exposed to asbestos for several years. This experience highlights the long-term problems associated with the proper disposal of hazardous waste materials.

BACKGROUND

A small mobile-home subdivision with 118 residents lies two miles from the copper-mining town of Globe, Arizona. The 38-home subdivision was constructed in 1973 on the property of an asbestos mill. In 1979, the homesites were accidentally discovered to be contaminated with asbestos.

Before 1973, three mills in the area of the subdivision processed chrysotile asbestos ore from nearby mines. After removing the longer asbestos fibers by blowing the crushed ores through a series of filters, the remaining ore tailings—still containing an abundance of shorter asbestos fibers—usually were dumped in large piles beside the mills. Failing to meet new EPA standards for dust emission, two of the mills were ordered to close by the Pinal-Gila Air Pollution Control District in 1973. Before closing, however, the owner of one of the mill sites was successful in obtaining a rezoning of the property into a residential subdivision. Asbestos mill tailings were used as the primary landfill material before partial covering with topsoil. Before being shut down, this mill continued operations for several weeks as residents moved into the subdivision. The mill buildings, housing asbestos-laden equipment, remained standing in the midst of the mobile homes. The third mill, with its large pile of asbestos mill tailings, continues to operate a few hundred yards upwind from the mobile homes.

See related article, p. 400.

Abbreviations used
CDC: Centers for Disease Control
NIOSH: National Institute for Occupational Safety and Health

In October, 1979, asbestos contamination of the home sites was accidentally discovered by local health officials inspecting the waste disposal system. Small piles of asbestos mill tailings lay heaped against the defunct mill structures and adjacent railroad tracks. The contaminated soil was in easy reach of all the residents, including 26 children under the age of 13.

INVESTIGATION

The Centers for Disease Control was alerted to this problem by the Committee on Environmental Hazards of the American Academy of Pediatrics, and subsequently assisted the Arizona Department of Health Services in doing laboratory analyses for asbestos in air, soil, and household articles; developing and coordinating a questionnaire survey on exposure of all of the residents; and

From the Chronic Diseases Division, Center for Environmental Health, Centers for Disease Control, Public Health Services, U.S. Department of Health and Human Services; National Institute for Occupational Safety and Health, Centers for Disease Control, Public Health Services, U.S. Department of Health and Human Services; Arizona Department of Health Services; and Arizona Center for Occupational Safety and Health, University of Arizona.

**Reprint address: Chronic Diseases Division, Center for Environmental Health, Centers for Disease Control, 1600 Clifton Rd., Atlanta, GA 30333.*

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developing recommendations for decontamination procedures.

Asbestos contamination in and around the homes was confirmed by the Arizona Division of Occupational Safety and Health and by the National Institute for Occupational Safety and Health. Tailings found around the subdivision as well as tailings from the active mill contained approximately 60% chrysotile asbestos. Asbestos fibers contaminated most of the homesites. Selected soil samples suspected of being contaminated contained at least 5% asbestos in 44 of the 50 home lots; the soil contained over 50% asbestos in four samples. Chrysotile asbestos fibers (0.05 to 0.50 μ in diameter and 1 to 20 μ in length by electron microscopy) were present in dust from either furnace filters or vacuum cleaner bags in the eight households sampled. Airborne asbestos fibers, in concentrations of up to 4,000 fibers/m^3 (longer than 5 μ by light microscopy) were measured in undisturbed indoor and outdoor air. The concentrations were even higher (10,000 to 60,000 fibers/m^3) when four personal sampling devices were used. In one personal sample, the asbestos level rose to 350,000 fibers/m^3 during vacuuming of drapes and carpets in one of the homes. The current Occupational Safety and Health Administration occupational standard is 2,000,000 fibers/m^3 (2 fibers/ml) for an eight-hour, time-weighted average, although NIOSH/CDC has recommended that this be lowered to 100,000 fibers/m^3 (0.1 fibers/ml).[2] However, the occupational standard was not designed for the population at large, which may be exposed up to 24 hours per day, nor was it designed to protect children playing directly with asbestos-containing materials, as in Globe.

On January 11, 1980, William H. Foege, M.D., Director of the CDC urged the state to evacuate the residents and to decontaminate the subdivision. During February, 1980, the Arizona Division of Emergency Services, with the authorization of Governor Bruce Babbitt, provided temporary housing for the residents while their properties were being decontaminated. The families were instructed to launder all clothing and to wet-wipe all personal belongings before leaving their homes. Under state supervision, the old mill structure was demolished and buried. Enough soil was brought in to cover all the open land in the subdivision to a depth of at least 6 inches.

By a house-to-house survey, all the residents were identified by the Arizona State Department of Health Services so that they could be followed in the future. The families have lived in this subdivision for an average of two years, although some families have lived there continuously since 1973. The survey identified 12 residents having other past or present sources of exposure to asbestos, including working in asbestos mining (1) or milling (2), as pipe-fitters (3), and with automobile brake linings (6). None of the current residents have known asbestos-related diseases, namely, asbestosis, mesothelioma, or lung cancer. The survey also identified 35 cigarette smokers and 15 ex-smokers. Because of the synergistic (multiplicative) effect of cigarette smoking and asbestos exposure on the risk of lung cancer,[3] the Arizona Department of Health Services began a vigorous antismoking program for the adults and adolescents of the community. The residents have been urged to notify their family physicians of their asbestos exposure and to obtain baseline clinical examinations. Clinical abnormalities such as pleural thickening and calcifications will probably not be manifest for many years after this level of environmental asbestos exposure.[1]

DISCUSSION

Both human and animal studies have shown that chrysotile asbestos, the form present in Globe, is fibrogenic and carcinogenic. This conclusion has been reviewed and supported in official publications of the World Health Organization's International Agency for Research on Cancer, 1976[4]; NIOSH/CDC in its Revised Recommended Standard for Occupational Exposure to Asbestos, 1976[2]; and the Asbestos Advisory Committee, Health and Safety Commission, United Kingdom, 1979.[5]

Although review of the epidemiologic literature suggests that there are differences in the degree of fibrogenicity and carcinogenicity of the various asbestos fibers[4] (the new British standard, for example, is more stringent for crocidolite and amosite asbestos fibers than for chrysotile), there is no reason to minimize the health risks posed by chrysotile asbestos. Recent reports of experimental animal studies[6-9] and human epidemiologic studies[10-13] continue to show a positive correlation between exposure to chrysotile asbestos and disease, including asbestosis, lung cancer, and mesothelioma.

In the particular situation of this housing subdivision in Globe, there was heightened concern because of the ready availability of asbestos to children and other residents, the high respirability of the milled fibers, and the continuing environmental contamination from the mill sources. The exposure of children is of particular concern because they were observed playing directly with tailings and because of their long life expectancy, which exceeds the prolonged latent periods for asbestos-related disease.

This episode demonstrates the need to identify and mark waste disposal sites which are not suitable for human habitation. Problems are more likely to occur when waste disposal occurred further back in time and outside of public or institutional knowledge, and with substances for which the long-term toxicity is not as

well defined as for asbestos, which is a universally accepted carcinogen.

POSTSCRIPT

Residents of the subdivision continue to report visible airborne dust from the active asbestos mill and tailings pile. Although the soil was seeded initially, heavy rains in the summer of 1980 eroded part of the topsoil cover and at places exposed the contaminated soil. This result points to the importance of continued monitoring of the homesites and of their residents, and to the need for further protective efforts.

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Etiology of osteomyelitis in patients with major sickle hemoglobinopathies

Laurence B. Givner, M.D.,* Ruth E. Luddy, M.D., and Allen D. Schwartz, M.D., *Baltimore, Md.*

PHYSICIANS caring for patients with major sickle hemoglobinopathies (Hgb SS, Hgb SC, or Hgb Sβ thalassemia) generally agree that salmonellae are responsible for the majority of cases of osteomyelitis in this patient population. A recent review, however, stated that osteomyelitis in patients with sickle cell anemia is "usually caused by staphylococci and rarely salmonella."[1] This prompted us to examine our experience and to review the literature to see which organisms most commonly cause osteomyelitis in patients with major sickle hemoglobinopathies.

From the Division of Pediatric Hematology-Oncology, Department of Pediatrics, University of Maryland School of Medicine.

**Reprint address: Room 5-109, University of Maryland Hospital, 22 South Greene St., Baltimore, MD 21201.*

METHODS

Since July 1, 1971, a log of all children admitted to our inpatient service has been kept. Based on this log for the period of July 1, 1971, through January 31, 1981, medical

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