

Medical News

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Experts cite paralysis of asbestos exposure control efforts

One hears that considerable trouble is now taken to prevent the inhalation of asbestos dust, so therefore the disease is not likely to appear in the future." So proclaimed a British public health official in 1906 concerning the major health problem posed by the fledgling British asbestos industry.

Since that time, in the United States alone, 30 million tons of asbestos, "the wondrous mineral fiber with the strength of steel," has been nonetheless employed in many products. The result? A public health disaster of unprecedented dimensions (*JAMA* [MEDICAL NEWS] 239:2215-2216, 1978).

Experts in the study of asbestos-related disease—*asbestosis*, lung cancer, and *mesothelioma*—now estimate that during the next 40 years, an average of 20,000 deaths per year will result from asbestos exposure. In the period between World War II (when asbestos use first became widespread) and the end of this century, well over half a million Americans will have died of asbestos-related disease, according to Irving J. Selikoff, MD, director of the Environmental Sciences Laboratory at the Mount Sinai School of Medicine in New York.

What is being done to prevent slow deaths caused by asbestos inhalation? Who is examining the 10 million workers estimated to have been exposed to the substance on their jobs since WW II? Who will accept responsibility for containing the mountain of asbestos now in place?

The answers are: nothing and no one. Aside from meager attempts to regulate new asbestos use and to monitor occupational exposure, virtually nothing is being done to remedy the public health failure and turn back the legacy of death from asbestos.

What is worse, 700,000 tons of asbestos is still used annually in the United States to make products such as cement pipe, brake linings, asbestos paper products, and textiles. Virtually no precautions other than a maximum exposure standard for workers that some consider unacceptably high are being taken to prevent asbestos-related disease.

"Unless we learn the lessons of the past," predicts Selikoff, "we are destined to compound the deadly legacy of asbestos and start the clock ticking for the next 40 years."

Asbestos is an extremely useful fibrous mineral. The two commercially used varieties, *serpentine* and *amphibole* asbestos, are strong and durable with insulating qualities beyond comparison. But the minute fibrous nature of asbestos that makes it so

useful also makes it deadly.

While asbestos fibers are visible to the naked eye, the component fibrils can be detected only with the electron microscope. In the lung, cellular-mineral contact results in interaction between the fibril surfaces and intracellular, perhaps even intranuclear, components of cells. Although the pathogenic mechanism remains unclear, these interactions result in a fibrotic reaction (*asbestosis*), lung cancer, or both.

Therapy of Asbestos Diseases

There is no truly effective treatment for any of the asbestos-related diseases, which include *asbestosis*, *mesothelioma*, cancer of the lung, and some cancers of the esophagus, stomach, or colon-rectum (Selikoff LJ, Hammond EC, Seidman H: Mortality experiences of insulation workers, United States and Canada, 1943-1977. In *Health Hazards of Asbestos Exposure* [international conference]. *Ann NY Acad Sci* 330:91-116, 1979). A long latency period (25 to 30 years in most cases), difficulty in diagnosis, and the lack of any widely applied long-term surveillance mechanism all spell a grim outcome for the asbestos-exposed population.

Although the malignant neoplasms result in higher mortality, *asbestosis*—a fibrous scarring of the lung that causes diminished pulmonary function—is the most common asbestos-related disease. Such pulmonary fibrosis is irreversible. Current treatment consists only of ending further exposure and administering oxygen in the case of breathing difficulty.

According to Anthony Robbins, MD, director of the National Institute of Occupational Safety and Health (NIOSH), *asbestosis* patients, because of diminished pulmonary reserves, "should be treated very aggressively with antibiotics" if any respiratory tract infection such as bronchitis develops.

Lung cancer is the most common asbestos-induced cancer and is made worse by the accompanying lung fibrosis. Alvin Tierstein, MD, director of the Pulmonary Service at Mount Sinai and an expert on treating asbestos-related disease, calls diagnosis of lung cancer in these cases "a hell of a job" because the fibrosis obscures the radiological findings.

Mesothelioma is a malignant tumor of the pleura and peritoneum. Known as a "signal" neoplasm because it almost never occurs except in cases of asbestos exposure, *mesothelioma* is thought to occur

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at much lower exposure levels than are known to cause asbestosis. This is evidenced by the high incidence of the disease among family members of asbestos workers.

While Selikoff and Tierstein are pessimistic about treating mesothelioma, Philippe Chahinian, MD, assistant professor in the Department of Neoplastic Diseases at Mount Sinai, says that the situation "is not desperate."

Currently at Mount Sinai, investigators are working with two treatment protocols, he says. The first is a combination of doxorubicin hydrochloride and radiotherapy of the hemithorax. In 14 patients the median survival has been 12 months.

The second protocol combines doxorubicin hydrochloride and azothymidine without radiotherapy. In 40 patients the median survival has been 21 months from diagnosis. Chahinian describes these results as very encouraging compared with the past.

"Mesothelioma is an insidious disease," he told JAMA MEDICAL NEWS. "There is often a delay between symptoms and diagnosis because patients have only a small amount of pain, not enough for them to seek medical care." While evidence of the disease does turn up on x-ray films, it is difficult to diagnose and has often progressed beyond the aid of surgery by the time of diagnosis.

In some cases, according to Tierstein, benign disease, resulting in a thickening of the pleura, is detected. In these cases, a pleurectomy can sometimes be performed although this is extremely difficult.

One factor that can add immensely to the risk of development of lung cancer among asbestos-exposed workers is cigarette smoking, as Selikoff's work has shown. In one Mount Sinai study cohort, asbestos workers who smoked had a risk of lung cancer up to 90 times that of persons who neither smoked nor worked with asbestos and up to 30 times that of nonsmoking asbestos workers.

"Anyone with even the slightest suspicion of asbestos exposure should absolutely be convinced not to smoke," says Selikoff.

In an extensive interview with JAMA MEDICAL NEWS, Selikoff, who is considered by many to be the world's foremost expert on environmental disease, stressed that the epidemic of asbestos-related disease is a public health failure rather than a failure of the medical profession.

"The medical profession is accustomed to rapidly evaluating and treating known health problems," he said. "We take information made available to us by science and use it to correct a problem."

Not so with asbestos, says Selikoff, even though it is known to be a serious health hazard. We are trapped by the substance. It has crept into our buildings, our schools, our homes, and our cars, and we have made an unconscious decision to accept some level of



Asbestos removal: Worker in New York City school sealing area where asbestos has been used in classroom ceiling. He is wearing a respirator and special garments to protect him from possible airborne asbestos particles. Upon leaving area, he is required to dispose of garments and to shower. (Photograph courtesy of Du Pont Company.)

mortality as the price we must pay for its usefulness.

"One hundred years ago the problem was infectious disease," says Selikoff. "That was much easier to conquer. There was no public relations firm promoting the tubercle bacillus and it was not deliberately woven into the fabric of our society."

Another public health problem is the relatively poor understanding among most practicing physicians regarding asbestos diseases. Unless a physician works in an area directly adjacent to an asbestos exposure site like a shipyard, he is unlikely to know much about the subject.

According to Margaret Sloan, MD, of the Division of Cancer Control and Rehabilitation at the National Cancer Institute (NCI), there is a serious deficit in physician knowledge concerning asbestos disease. To correct this, the NCI is aiming educational material at four categories of physicians: radiologists, pathologists, chest physicians, and various types of general practitioners.

Says Sloan, "Radiologists are unable to interpret the indications of asbestosis such as pleural plaques on x-rays. And, due to the many different cellular patterns of asbestos disease, pathologists often have extreme difficulty in making a diagnosis. A disease

like mesothelioma often looks like metastatic cancer from another site. Also many chest physicians are totally unfamiliar with the manifestations of asbestos-related disease."

Perhaps most confusing of all, those concerned have not been able to agree on the most effective way of intervening in the course of asbestos disease. Will early detection have any impact on mortality? Should all those known to have been exposed to asbestos be subjected to periodic sputum cytological examinations and chest x-ray films? Who will pay the massive costs of such long-term surveillance? There are no answers.

"At this point screening to detect asbestos disease probably will not be effective," says the NIOSH's Robbins. "We have just begun programs to inventory all existing asbestos and to identify all the sites of human exposure, past and present. The continued use of asbestos, despite clear knowledge of its dangers, verges on the criminal."

Indeed, the foolhardiness of our past use of asbestos was the subject of a lengthy seminar at the recent annual meeting of the American Public Health Association in New York. According to David P. Rall, MD, director of the National Institute of Environmental

Health Sciences, the peak mortality from the first major group of heavily exposed asbestos workers—WW II shipyard workers—will occur in the coming decade.

"A second group of heavily exposed workers," noted Rall, "is an erratic but slowly increasing group of shipyard, maintenance, insulation, and construction workers whose exposure to asbestos began in the late 40s and has continued to date. The use of asbestos has doubled during this time, and it will be the role of public health physicians to deal with the disease which we can expect to occur."

The asbestos experts, mainly the staff at Selikoff's Environmental Sciences Laboratory, have been busily identifying several areas where exposure to asbestos can be expected to result in future disease.

Not surprisingly, they predict continued shipyard asbestos disease. While the US Navy stopped using the substance in new ship construction several years ago, there is now afloat a massive fleet of ships coated with asbestos. Over time, these ships must be repaired, refitted, and eventually broken apart as they become obsolete.

Says Selikoff, "Our latest survey of workers at a
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Sudden death brings East and West together

Sudden death from cardiovascular causes will claim some 400,000 lives in this country during 1980.

By definition of the World Health Organization, these are deaths occurring unexpectedly within six hours of symptom onset in apparently previously healthy persons or in patients considered to be in satisfactory condition. Such sudden deaths—some of which are being averted by increasing public use of cardiopulmonary resuscitation techniques, improved emergency-rescue systems, and sophisticated coronary care facilities—probably will account for about 40% of the expected overall toll from cardiovascular diseases in the United States this year.

In turn, cardiovascular mortality accounts for 32% of all deaths among Americans annually. So it is clear, say cardiologists such as G. Charles Oliver, MD, Washington University School of Medicine, St Louis, that sudden death is a leading cause of mortality in this country.

It also is a major prob-

lem in other countries, including the Soviet Union. According to Anatoliy M. Vikhert, MD, DMS, National Cardiology Research Center, USSR Academy of Medical Sciences, Moscow, up to 75% of all deaths from coronary heart disease in that country occur suddenly.

In 1973, the Joint US-USSR Committee for Health Cooperation agreed to focus on sudden death in some collaborative studies.

At the conclusion of the Second Joint US-USSR Symposium on Sudden Death, held at Indiana University School of Medicine, Indianapolis, in December, that agreement was extended through 1982. Involved are further exchanges of visits and information and a third symposium in the Soviet Union in 1982.

The new agreement was signed by symposium co-chairmen Vikhert and Bernard Lown, MD, professor of cardiology, Harvard University School of
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Drs. Vikhert and Lown.

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Baltimore shipyard who are engaged solely with repair work—no new construction—showed that among workers with 20 or more years on the job, 85% have abnormal x-ray findings. No precautions are now being taken, and few warnings are given to the hundreds of thousands of shipyard employees now at work.

Another area of emerging concern is asbestos use in schools and public buildings. According to William J. Nicholson, MD, of Mount Sinai, there is a "good possibility" that when the latency period of asbestos disease is up, there will be a great deal of disease related to exposure in schools.

Sprayed asbestos surfacing material has apparently been used extensively in schools in the past, and, because of general disintegration, aided sometimes by vandalism, measured asbestos levels in some schools have been equivalent to occupational levels. As an example, according to Nicholson, 10% of all New Jersey's schools have sprayed asbestos surfaces, one third of which are crumbling. In Massachusetts, 20% of public schools have asbestos surfaces.

Recently, the US House of Representatives approved a three-year program of \$30 million in grants to school districts to search for asbestos in school buildings and \$300 million in loans to remove it. The measure has now gone to the Senate.

Perhaps the most cruel exposure to asbestos is through household contact with another family member who has been occupationally exposed. More and more of these cases are being reported. Because of the relatively low doses involved in household contact, it seems that some family members may be escaping asbestosis but suffering more cases of mesothelioma.

This brings up the question of the dose-response ratio of asbestos, a point on which there is little disagreement. Says Rall, "While it seems that the less the exposure, the more slowly asbestos disease will develop, it remains clear that there is no dose threshold below which asbestos exposure is safe."

Adds Selikoff, "There should be no asbestos exposure at all. This is the only way to eliminate asbestos disease."

The Environmental Protection Agency (EPA) concurs. "The EPA is convinced of the substantial risk with any asbestos exposure, even at very low levels," says Richard Guimond of the Office of Chemical Control of the EPA.

Recent data to support the no-threshold contention come from Philip E. Enterline, PhD, of the Department of Biostatistics at the University of Pittsburgh. In his article just published in *Health Hazards of Asbestos Exposure* (*Ann NY Acad Sci*, Vol 330, 1979), Enterline estimates cumulative dust exposure of asbestos workers in millions of particles per cubic foot. A linear curve relating cumulative dust exposure of asbestos workers at the time of retirement to mortality from respiratory cancer shows that with no exposure there is no increase in mortality over standard rates, with modest exposure there is a

modest increase in mortality, and with heavy exposure there is a great increase in mortality from respiratory cancer. The data also show, according to Enterline, that the "effects of asbestos exposure continue well past termination of exposure."

Several embryonic efforts are now under way to regulate future asbestos use and to revise the current exposure standard.

A major reduction in the current standard of 2 fibers per milliliter of air in the occupational environment is being considered by the Occupational Safety and Health Administration (OSHA) and NIOSH. The latter agency has recommended that this be reduced to 0.1 fibers per milliliter, but even this level would result in considerable exposure. "The asbestos situation is bad now and could get even worse," says Victor Alexander, MD, of OSHA.

Ironically, the current standard is the result of a British study (since proved incorrect) that a level of 2 fibers per milliliter would substantially reduce the chance of developing early asbestosis. The cancer risk was not considered at all.

At the EPA there are rumblings of a possible ban on the commercial use of asbestos, a proposal that, according to *Business Week*, is causing concern in the asbestos industry. The agency at this time appears nowhere near implementing this proposal.

However, says Guimond, "There is a high probability that the EPA, at some time, will implement a total ban on commercial use of asbestos."

Asbestos substitutes are being explored and used, of course. These include fiberglass for fire retardation; ceramic fiber and polyacrylonitrile for textiles; calcium silicate, mineral wool, and expanded perlite for building insulation; and a compound of cellulose and clay wastes or a semimetallic friction material built around steel fiber and iron powder for brake linings. The latter two compounds, in particular, are said to be inferior to asbestos for such use.

Perhaps Selikoff offers the most plausible explanation for the apparent paralysis in control efforts.

"This is a social problem," he told *JAMA MEDICAL NEWS*. "In the United States we have made an unacknowledged decision to control asbestos rather than to ban it. Banning is easy. Control is much more complicated."

"But we haven't lived up to our contract in this case," he continued. "We haven't accepted the consequences of control. I hear people rail all the time against regulation. I don't like regulation any more than the next guy, but without it no effort at control can be successful."

On the subject of what lies ahead with asbestos, Selikoff is gloomy.

"I see exposure continuing," he said. "Things don't always turn out for the best. Doctors know this perhaps best of all. Time doesn't solve everything. I'll just say that I have guarded pessimism about the whole thing."—by JOHN ELLIOTT

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