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THE ASBESTOS PROBLEM

An asbestos curtain was once the very symbol of safety and security. When primitive stage lighting made the risk of theater fires a constant worry, the presence of a fireproof curtain reassured audiences that a blaze could be contained long enough for them to escape it. Now the tables are turned; disease caused by asbestos has become a matter of serious concern.

Since antiquity, asbestos had been made into such items as permanent lamp wicks or novelty fabrics that would not burn. But early in this century, the use of asbestos grew like wildfire (so to speak). A potential health hazard was suspected very early, but it wasn't until the 1960's that its full magnitude became evident.

THE MATERIAL: Asbestos is a family of similar minerals that all occur naturally as a kind of soft rock made up of compressed fibers. One of the best insulators known, it protects what it covers from heat, corrosion, or electrical damage. It is also strong and durable. The mineral fibers can be handled in ways similar to vegetable fibers; they can be spun, made into felt, or bonded with other substances to form durable materials.

By now there are 3,000 uses of asbestos. Insulation for buildings is made from the material; huge amounts have also been used to insulate boilers and pipes in ships; automobile brake linings and clutch plates have been made of asbestos since the early 1900's. Asbestos has been incorporated into cement to strengthen it for use in pipes and other formed objects. Asbestos filters are used in the manufacture of some imported wines. For many years, hair dryers were insulated with the material. Until recently, asbestos was commonly incorporated into the spackling and taping compounds used for drywall construction. From 1946 to 1973, asbestos was added to coatings that could be sprayed onto walls or other structures in lieu of plastering them.

In all, some 30 million tons have been used in the United States since the beginning of this century, and by its end, according to one estimate, some half a million people will have died as a result of their exposure to asbestos.

THE PROBLEM: Asbestos produces disease only when it is inhaled (or possibly swallowed). Minuscule fibers of the material (some too small to be seen with a standard microscope) are drawn into the lungs. There the fibers are taken up by cells responsible for cleaning the air passages, but these fibers cannot easily be broken down for removal. Instead, the fibers remain in place or migrate slowly toward the periphery of the lungs. Some may even travel across the diaphragm into the abdominal cavity (peritoneum), whereas others probably arrive there after being swallowed.

It appears that asbestos creates problems solely because of its physical properties, not because of its chemical nature. The tiny size of asbestos particles is important; if they were larger, the frag-



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ments would settle out in the large airways, which are better equipped to remove foreign substances than the very small ones. The shape also matters; needle-like dimensions, which are typical of the asbestos crystal, appear to increase its ability to cause disease. Unfortunately many of the possible substitutes for asbestos, such as certain newer types of fiberglass, acquire these characteristics in the process of being developed into better insulators. In other words, the desirable properties of asbestos as an insulating material are also the ones that make it dangerous. Even so, it appears so far that asbestos is more potent in causing disease than other effective insulating substances, such as fiberglass and rockwall.

Thirty or so years after asbestos dust is inhaled, but sometimes much sooner (depending on dose), it begins to cause several types of detectable disease:

(1) Asbestosis is a sometimes fatal condition, that results from significant, but not necessarily heavy exposure. It hardly ever occurs except in people who have worked with asbestos or with products containing it. This is, however, the most common disease produced by exposure to the material, though not the most common cause of death, which is lung cancer. Asbestosis is a kind of scarring process, one that takes place within the lung tissue itself or on its outer surface. Asbestosis causes the air spaces to become smaller or obstructed, and the lung itself to become more rigid. There is no effective treatment to prevent or reverse the scarring. As a result, breathing is difficult, oxygen and carbon dioxide are poorly exchanged, and lung infections are easily acquired. This disease or its complications can progress, even without further exposure to asbestos.

Lung infections, such as pneumonia or bronchitis, are extremely threatening to people with asbestosis. They should be vigorously treated, usually with antibiotics, at the first sign of a respiratory infection. Stopping smoking is critical: cigarette smoke not only makes asbestosis more dangerous, difficult to live with, and hard to treat, it markedly increases the risk of lung cancer in anybody who has been exposed to asbestos.

(2) Lung cancer is extremely common among people who have worked with asbestos, many of whom smoke. For some unknown reason, the combination of cigarette smoke and asbestos is much worse than would be predicted by adding together the risks from each. Anyone who has been exposed to even small quantities of asbestos dust should do everything he or she can to stop smoking. The outlook for those who stop is much better than for those who continue. As is the case with all lung cancer, by the time symptoms occur, it is usually too late for curative treatment, and no good tests for earlier detection are available.

(3) Mesothelioma, several other types of cancer, occur mainly in people exposed to asbestos dust. These tumors arise from the membrane that lines the chest or abdominal cavity, and they are highly malignant. Although they are rare, mesotheliomas can occur even after a limited exposure to asbestos dust and may affect people who were not directly involved in handling the material, such as relatives of asbestos workers. A very long time — forty years or more — can elapse between exposure and the appearance of mesothelioma, although many cases appear earlier.

Some other types of cancer, occurring outside the lungs, also appear to be somewhat more common in people exposed to asbestos dust. A few other diseases may also be more common, and it appears that the suicide rate in former asbestos workers is as much as two to three times higher than in the general population.

WHAT TO DO?: The asbestos situation raises two questions: What can individuals do to protect themselves and their families? What should we do as a nation to prevent further injury from exposure to asbestos?

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The answer to the first question is reasonably straightforward for people who do not work with the material. Asbestos is only dangerous when it produces dust. Left undisturbed or bonded into durable slates, tiles, or other materials, it presents virtually no risk. But asbestos-containing insulation around pipes or boilers and in walls, wall coverings, or spackling compounds that are sawed, cut, sanded, or are exposed to damage from routine use, may give off considerable quantities of asbestos dust. Nobody should work with such materials unless he or she is adequately trained and is fully protected from inhaling the dust. Deteriorating asbestos materials should be removed, covered with an effective sealant, or enclosed under another covering. Expert advice is needed both to determine whether there is an asbestos problem in a given area and to choose the proper method for dealing with the hazard.

Spray-on wall coverings that contain asbestos present a special problem. This inexpensive technique was rarely used in homes but quite frequently in school construction. Water damage, heavy use, and occasionally vandalism have caused the coatings to begin disintegrating in some schools, and several states have begun programs to detect and correct the problem. Unfortunately such efforts are expensive and, all too often, underfunded.

People who work with asbestos and its products, including those who repair existing objects that contain the material or are covered with it — such as plumbers, shipyard workers, brake and clutch workers, construction workers — are entitled to protection from asbestos and the diseases it causes. They should be fully aware of the amount of asbestos dust that they breathe while they earn a living. Unfortunately, employers — both private industries and the government — have often been negligent, failing to inform employees about asbestos exposure or to protect them from it. Workers at risk of exposure should insist that the air they breathe be frequently sampled and analyzed by an appropriate method. Employers and workers should cooperate in bringing fiber counts in the air well below the current legal standard (2 million fibers per cubic meter), which is probably at least twenty times too high. Face masks and respirators are not as effective as ventilation control or improved handling, such as "wet processing."

The second question — what national action should be taken — is much more difficult to answer. There is no doubt that asbestos represents a major public health problem, one that extends beyond the large group of people who suffer from occupational exposure. Every possible way should be found to remove it from the human environment. But eliminating the substance from existing structures or from industrial applications may not be feasible for technical, economic, or political reasons. Meanwhile, there is controversy about the amount of asbestos exposure that is compatible with good health. Enforcing existing regulations, let alone more stringent ones, is difficult.

To date there has been no coherent, effective government program for dealing with the asbestos problem. Responsibility has fallen partly on the states and partly on several federal agencies. At a minimum, the federal government should be expected to take the initiative in developing a unified program to conduct research on asbestos diseases, measures to control exposures, and substitute materials. Technical advice and support should be offered to local control programs, and a policy should be developed for the future. Asbestos diseases become a medical problem only when it is too late to cure them. Preventing these diseases is a political challenge, not a medical one.

HIDDEN INGREDIENTS

Thousands of Americans every day consume a drug similar in structure to amphetamine ("speed") without knowing it. That sounds like a scare headline — but is in fact true. The drug in this case, is phenylpropanolamine — PPA for short — which is a common ingredient in dozens of cold and cough remedies of both the prescription and the non-prescription variety. (As such, PPA is no different from many other drugs that are consumed as ingredients in various cold remedies.) Recent articles in the British medical journal The Lancet point out that PPA has two actions which

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ASBESTOS

This material, used extensively for protection against fire and heat hazards, ironically is a recognized hazard to health when asbestos dust is inhaled excessively, causing asbestosis, bronchogenic (lung) cancer, and mesothelioma. The industry's many problems and its far-reaching response to OSHA regulations are presented.

ASBESTOS, used since antiquity, has widespread and important applications in our modern technological society. Approximately 3,000 different kinds of products containing asbestos are in daily use throughout the world. Its increasing use has lent urgency to the need to cope with occupational health problems related to the excessive inhalation of asbestos dust.

Asbestos is actually a general term used to describe several fibrous mineral silicates that occur as white, grayish, or greenish masses, either compact or as long, silky fibers. The most important types are:

- *Chrysotile*—a simple magnesium silicate;
- *Amosite*—a complex magnesium iron silicate;
- *Crocidolite*—a complex sodium iron silicate.

Some 97 per cent of the world as-

bestos production comes from chrysotile.

Basically, the known facts about asbestos-related disease can be summed up as follows:

- 1) Asbestos-related health risks today are almost exclusively confined to the occupational setting;
- 2) The effects of excessive inhalation of asbestos are both time- and dose-related—this means that asbestos-related diseases may develop, generally, only after the inhalation of substantial amounts of asbestos dust over a substantial period of time;
- 3) There is presently no evidence of risk to the general public from exposure to the minute amounts of asbestos that have been found in community air;
- 4) Because of the long latent period of asbestos-related disease, the

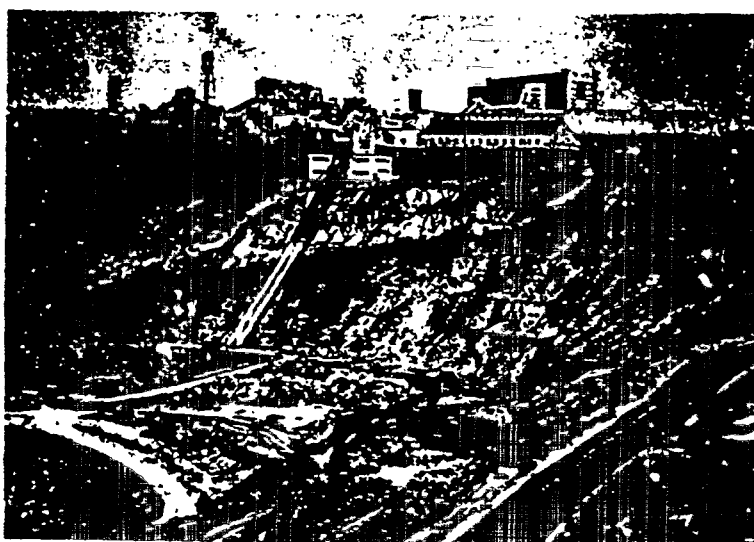
disease being found today, among some long-term industry employees is not necessarily an indication of present-day conditions. It may, instead, be a result of conditions existing decades ago, at a time when neither the industry, government, nor the medical profession knew much about the health effects of asbestos, or proper means for their control.

What Is the Hazard?

More than 200,000 employees face risks from asbestos. The principal danger is caused by inhaling asbestos fibers. Recent studies also have shown the presence of asbestos fibers in the lungs of persons having no industrial exposure — probably due to their presence in the atmosphere near construction sites, where an asbestos mixture formerly was commonly sprayed onto steel beams as a method of making the structure fire resistant. This practice has been banned by *Occupational Safety and Health Act* regulations.

Prolonged inhalation of asbestos fibers between 5 and 50 microns long (one millionth of a meter) can produce a lung disease known as asbestosis. The lungs cannot eliminate asbestos fibers, so the fibers coat the tissues. If this process continues over a period of 10 to 20 years with significant quantities of asbestos present, the tissue reaction progresses until a generalized diffuse fibrosis occurs, causing severe respiratory disability. There have been reports of increased incidence of lung cancer in persons with asbestosis.

There are three primary diseases known to be caused or exacerbated by prolonged and heavy inhalation of asbestos fibers. They are *asbestosis*, *bronchogenic (lung) cancer*, and *mesothelioma*.



Chrysotile is mined in open pit mines, such as this one in Canada. (Photo: courtesy Asbestos Information Association/North America).

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