

MEN AND MOLECULES

Transcript #424

THE CASE AGAINST THE MAGIC
MINERAL, PART I

American Chemical Society
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NARRATOR:

The American Chemical Society presents...MEN...AND...MOLECULES...the story of chemical research. This is Stuart Finley. This week, the first of two reports on THE CASE AGAINST THE MAGIC MINERAL.

NARRATOR:

Every occupation has its obvious drawbacks with which we can usually cope. But for many of the men who mine and work with asbestos--a mineral famous for its ability to stand up to fire--the hazard has not only been invisible, it has also been deadly. In the past two decades the evidence has mounted that asbestos is a potent cause of cancer, and that it is the major cause of what was at one time a rare form of cancer. Since the Greeks--who noticed that slaves working with asbestos had lung troubles--people have accepted the idea that years of exposure of asbestos can scar the lungs. The definite link with cancer was not made until this century, and it has only become clear since the 1950's of just how powerful that link is. Part of the evidence was supplied in 1954 when Dr. Irving J. Selikoff, now professor of environmental medicine at the Mt. Sinai School of Medicine, decided to keep track of what happened to eighteen asbestos workers who had been forced to leave the industry because of a factory closing.

SELIKOFF:

Of the eighteen men, twelve are now dead. They died primarily of two things; first scarred lungs, in other words: what we call asbestosis, a dust disease of the lung due to asbestos; or of several forms of cancer. Why people who breathe in asbestos have a much greater risk of dying of cancer, we do not know. The first case of a man dying of cancer of the lungs, who also had asbestosis, was only reported in 1935. Numerous reports since then have confirmed this original report. Other cancers, including a very peculiar one called mesothelioma, are now also reported in very much greater incidence among people who regularly work with asbestos. Why these tumors appear, we do not know.

NARRATOR:

Mesothelioma is a cancer of the tissue, or membrane, that lines the lungs and abdomen. It is a cancer so rare--perhaps one case in ten thousand--that few physicians ever see a case. But the incidence of it as well as more better known cancers, such as lung cancer, are apparently being raised by asbestos.

SELIKOFF:

Incidentally, one thing is very interesting about these tumors. They do not appear the moment an individual begins to work with asbestos. They generally don't appear until more than twenty, twenty-five, or thirty years have passed since the onset of employment with

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SELIKOFF: (Cont'd)

the material. Now we understand the problem, however, and now, therefore, we come to a time when we should do something about it.

NARRATOR:

Doing something about asbestos should be in many ways a simpler job than dealing with some of the other hazards to health...cigarette smoking, air pollution, to name two. The sources of asbestos are limited--Canada and the Soviet Union supply most of it. The asbestos industry is relatively small, so modifying it won't shake the economy. But one of the difficulties in dealing with asbestos is that although we're surrounded by the stuff, it's rarely seen. It lines the brakes of our cars; most of the materials used to construct our homes and offices contain asbestos. It's in textiles, plastics, and cables. There are an estimated three thousand different industrial uses for asbestos in the United States alone. It is light weight but strong, and it won't decay. It resists most chemicals. It's such an ideal material, that it's been called the magic mineral, which incidentally, was the title of a recent report on asbestos in The New Yorker Magazine. But while asbestos may be magical, it is not a mineral, but rather a group of minerals with unusual properties in common.

SELIKOFF:

If we can imagine a fiber, like cotton or silk or wool made of mineral, we can understand these properties, and how valuable they would be in modern industry. In other words, they would be fire proof; they would be largely chemical proof; they would be water proof; rock proof; and so forth. Therefore, they are very useful for reinforcement--being very strong. It's very useful for insulation, very useful as a filler--an inner filler--in many materials and indeed it is a wonderful material. It is wonderful in industry; it is not so wonderful in the human lung.

NARRATOR:

The studies of Dr. Selikoff and others in many countries made it appear that people directly exposed to asbestos for a long period of time were likely to develop scarred lungs, and, if they lived long enough, various forms of cancer. But still the evidence was on shaky ground, based on a fairly small sample of people, and limited to those who had direct and long-term exposure to asbestos. That picture changed in 1964 when Dr. Selikoff and his Mt. Sinai colleagues, along with Dr. Cuyler Hamond of the American Cancer Society, reported on the fate of six hundred and thirty-two men who were members of the Insulators Workers Union in New York City. These were men who installed asbestos containing insulation; they didn't make it. They had been members of the union since 1942. Dr. Selikoff and his colleagues knew their ages, they knew the years of exposure to asbestos insulation, and they knew how many should die of any particular disease.

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SELIKOFF:

We calculate that the six hundred and thirty-two men, given their ages and given the years in which they were living, there should have been two hundred and three deaths among them. There were two hundred and fifty-five. In other words, approximately fifty more men died than would have been expected in a group of six hundred and thirty-two men of the same age over the same period of time. When we looked at the causes of death, we found the reasons for this excess mortality. There should have been six or seven deaths due to cancer of the lung; there were forty-five. There should have been nine or ten deaths due to cancer of the stomach, or cancer of the colon; and there were twenty-nine. There should, by the way, have been no deaths due to mesothelioma; and there were four.

NARRATOR:

That study of the insulation workers, which made the lethal risks of their occupations so obvious, covered a twenty year period from 1942 to 1962.

SELIKOFF:

Since then the results have been equally bad. For example, in the last one hundred and twenty deaths, there should have been no deaths due to mesotheliomas, which is very rare; and there were fourteen. There should have been two or three deaths due to cancer of the lung among the surviving men; and there were twenty-seven. So that the results indicate that working with asbestos, as a member of the Insulation Workers Union in the New York area during these last twenty-six years, has significantly increased the risk of dying of very serious diseases.

NARRATOR:

This study by Dr. Selikoff and his colleagues--now a classic in environmental medicine--removed any doubt about the terrible penalties that could be paid for a lifetime of exposure of asbestos. But even more disturbing evidence began to accumulate--evidence that suggested that even indirect exposure to asbestos might lead to mesothelioma, the cancer now considered a marker disease of asbestos. And other clues came suggesting that even a brief exposure, a matter of weeks instead of the decades associated with lung scarring and cancer, could result in mesothelioma twenty or thirty years later. The evidence of the hazards of indirect exposure to asbestos came in part from Dr. Mureil Newhouse, an epidemiologist working in London.

SELIKOFF:

She has found, for example, in studying seventy-six mesotheliomas at one hospital--the London Hospital--that, as expected, thirty-one occurred in asbestos workers--people who had in one trade or another worked with asbestos. Of the forty-five who had no history of working with asbestos, nine occurred in people who simply lived in a household of an asbestos worker, and who were presumably exposed to

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SELIKOFF: (Cont'd)

the fibers brought home on the work clothes. And of the thirty-six who neither worked with asbestos, nor lived in a household of an asbestos worker, eleven simply lived within a half mile of an asbestos plant. This raises the very serious question: whether a neighborhood exposure, or exposure within households, or indirect occupational exposure carries a risk similar to that of the individual working regularly with asbestos, although, perhaps to a lesser degree. The exact degree to which that risk occurs is what we must find out. If it's very small, there's no great problem; if it's very large, then the problem is multiplied a great deal.

NARRATOR:

The evidence that even fairly brief exposure of high levels of asbestos can bring on mesothelioma, cancer of the membranes that line the lungs and abdomen, has been gathered in bits and snatches, really more anecdotal than scientific. Nevertheless, Dr. Selikoff and his colleagues are seriously worried about the stories they hear. For instance, there was the case of a patriotic young woman.

SELIKOFF:

This was a young woman--at the time a student at Wellesley--who, in response to patriotic appeals, worked during her summer vacation in 1943 in one of the shipyards in Boston for six weeks doing insulation work about destroyer escorts. She breathed in significant amounts of asbestos during those six weeks. The fact that during the next twenty-five years she didn't have additional exposure to asbestos does not mean that the fibers that she inhaled during those six weeks were not exposing her lung cells to the effects of asbestos.

NARRATOR:

The young woman died of mesothelioma in the mid-sixties, roughly thirty years after a one-time exposure to asbestos. (BEAT) By now the obvious question looms. What of us, the people who have never worked with asbestos, have never known an asbestos worker, have never lived near a plant using asbestos, but do live in cities with buildings and cars that contain this magic mineral? Has asbestos found its way to the lungs of the general population? For a long time, many thought not. But they've changed their minds.

SELIKOFF:

In 1963 a sort of mild bombshell was exploded in our part of the scientific world by Professor John Thompson of Capetown. He published a paper then in which he stated that he had examined five hundred consecutive autopsies of adults in Capetown. Using a very simple technique--namely, making a smear of tissue fluid squeezed from the incised lung base and examining this fluid microscopically--he was able to demonstrate what are called asbestos bodies in twenty-five percent of all the people who came to autopsy at the University Hospital at Capetown at that time.

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NARRATOR:

In other words, one quarter of random selection of bodies had asbestos bodies in their lungs. Asbestos bodies are asbestos fibers coated with an iron-rich material, giving them a yellowish-brown appearance. Since the Capetown studies, the picture has become even more gloomy.

SELIKOFF:

From twenty-five to fifty percent of all people who are examined in post-mortems in such cities as Montreal, London, Milan, Belfast, Miami, Pittsburgh, and so forth have these asbestos bodies in their lungs. In New York City, we are examining three thousand consecutive autopsies in three of our hospitals--Elmhurst General Hospital, the Bronx Veterans Administration Hospital, and Mt. Sinai Hospital. And we have found that fifty percent of all the people whose lungs we've examined have those asbestos bodies or the structures which appear to be asbestos bodies in their lungs. Nevertheless, the numbers are very smaller than the numbers that we find in the lungs of people who regularly work with asbestos. Therefore, we must assume that the exposure of people in the general population is very much less at this time than the exposure suffered by asbestos workers. We do not know at this time, therefore, whether the health effects that might be associated with these much fewer fibers will be anything like the health effects suffered by asbestos workers.

NARRATOR:

As I said earlier, the asbestos problem is unusual in that its sources are limited, its uses known, and its effects documented. It is a problem with solutions.

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MEN AND MOLECULES

Transcript #425

THE CASE AGAINST THE MAGIC
MINERAL, PART II

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737-3337

NARRATOR:

The American Chemical Society presents...MEN...AND...MOLECULES...the story of chemical research. This is Stuart Finley. This week, the second of two reports concerning THE CASE AGAINST THE MAGIC MINERAL.

Dr. Irving J. Selikoff radiates the confidence of a natural optimist. A wearer of bow ties, with a liking for people and conversation, who approaches a task with gusto and zeal, it's obvious that Dr. Selikoff prefers to look at the bright side of things. In a way, that's fortunate considering the problems associated with asbestos--the magic mineral. Dr. Selikoff is Professor of Environmental Medicine at the Mt. Sinai School of Medicine in New York City. As you heard last week, he and other researchers in the United States, England, and South Africa have proven that those who had mined and worked with asbestos in the past are dying, at significantly high rates, of various cancers, including lung cancer, and a rare form of cancer called mesothelioma. Mesothelioma, a cancer of the tissue or membrane that lines the lungs and the abdomen, usually occurs in only one in ten thousand people, but has become all too common among people who've been exposed to high levels of asbestos. But what really worries Dr. Selikoff, and others, is that not only asbestos workers get mesothelioma, now considered a marker disease for asbestos, but their families may also get it. People who lived near an asbestos plant or mine have also gotten it. Even people regularly exposed at work for a few weeks to asbestos fibers may develop mesothelioma twenty-five or thirty years later--the time it seems to take between exposure and diagnosis. In addition, autopsies done at random on the lungs of people in many of the world's major cities have turned up asbestos bodies...iron coated asbestos fibers in twenty-five to fifty percent of the cases. But there were two questions we left unanswered last week: what is the danger of asbestos to the general population, the people who don't work with asbestos at all; and how long has this population been exposed to asbestos.

SELIKOFF:

We don't know. I suspect that it's relatively recent. The reason for this suspicion is as follows: there wasn't very much asbestos in use until relatively recently. For example, only fifty thousand tons per year were produced in the world around 1900. In 1930 the annual world production was five hundred thousand tons per year. We are producing much more asbestos now with the growth of our industry, the growth of our population, and the recognition of the excellent and industrial qualities of this mineral fiber. Therefore, we can almost assume that inhalation, or the potential for inhalation, is a relatively recent event. Since the diseases associated with inhalation of asbestos don't appear for twenty to thirty or more years, any health effect associated with asbestos, which is now being inhaled, will not be observed until around 1990 or the year 2000. I don't want to observe

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SELIKOFF: (cont'd)

these effects then, which is the reason for my concern that we prevent inhalation at this time.

NARRATOR:

Fortunately, asbestos, as we emphasized last week, is a problem with practical solutions. Its sources, uses, and effects are all known. Some of those solutions are already in effect, others being planned. We'll get to those in a moment, but first a word about the asbestos workers. What's being done to protect them against the magic mineral that is killing them? Unfortunately, for many of these workers--such as many of the members of the Insulation Workers Union with which Dr. Selikoff worked--little can be done. They've already had decades of exposure to asbestos, making it statistically certain that some of them, with time, will die of lung cancer and mesothelioma. A gloomy thought...

SELIKOFF:

Yes, this is a gloomy thought. But these are very unusual men--the insulation workers in New York and New Jersey. They are the old kind of self-reliant sturdy craftsmen. They are an intelligent--highly intelligent--group. These are independent individuals, as are many craftsmen in the construction trades. And, when faced with this problem, they have not sat wringing their hands, but have determined to do something about it. And much of the vigor and energy with which this problem is now being attacked has been due to the good activity of this group of workmen; that is, the union to which this group of workmen belong--the Insulation Workers Union.

NARRATOR:

Already a simple way has been found to cut down the rate of lung cancer among asbestos workers. That was to tell them to stop smoking. The justification for that was a study Dr. Selikoff did with Dr. Cuyler Hammond of the American Cancer Society, who, more than any other man, gathered the statistical evidence that cigarette smoking was a cause of lung cancer in the general population. Drs. Selikoff and Hammond studied the histories of eighty-seven asbestos workers who never smoked, and two hundred and eighty-three who did.

SELIKOFF:

Of the eighty-seven men who didn't smoke cigarettes, we didn't expect any to die of lung cancer, because people who don't smoke cigarettes by and large don't die of lung cancer, although a few do. That has been our experience among the asbestos workers as well. We have yet to see in New York City a death due to lung cancer in an asbestos worker who didn't smoke cigarettes. On the other hand, of the two hundred and eighty-three men who had a history of cigarette smoking, we should have expected, as cigarette smokers, two or three deaths due to lung cancer. There have been twenty-seven. This indicates that there is some combined multiple effect between asbestos and lung

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SELIKOFF: (Cont'd)

cancer. Dr. Hammond has calculated that an asbestos worker who smokes cigarettes has ninety-two times the risk of dying of lung cancer as compared with a person who neither works with asbestos, nor smokes cigarettes. Therefore, if asbestos workers will stop smoking cigarettes, and many have, we can probably eliminate a large part of the risk of lung cancer among them.

NARRATOR:

Unfortunately, at this point, there is no simple way to reduce the other possible result of working with asbestos--the appearance, twenty-five to thirty years after the fact, of mesothelioma, the cancer of lung and abdominal tissue, that is now a fatal and virtually incurable disease.

SELIKOFF:

We have observed mesothelioma among asbestos workers who do not smoke cigarettes. Therefore, a second approach is necessary: the approach of sharply decreasing the exposure to asbestos. Now, most of these men began work, and were exposed to asbestos, at a time when the risk was not known. Therefore, precautions were either minimal or non-existent. We now know these risks, and, therefore, it is important for us to design measures, knowing these risks, to eliminate them.

NARRATOR:

There are many ways to start, as Dr. Selikoff pointed out to us. Government has to set some sort of standards. Scientists have to come up with the proper information needed to set those standards. And the men working with asbestos, through their unions, have to help themselves. And the unions, as you've already heard, have made a start toward solving the asbestos problem.

SELIKOFF:

Labor unions, indeed, in the last several years, have almost led the way in demonstration of social responsibility. For example, at the present time, the only large-scale industrial hygiene program in the asbestos industry and the construction trades has been designed and had been worked out by the labor unions involved. This is a remarkable thing. It is remarkable that one of the building and construction trade unions have actually gotten together all their people and each member of this union is contributing ten dollars per year out of his own pocket to work out an industrial hygiene program to solve the problems within this industry. This effort on the part of labor has attracted the additional support of some segments of this industry. For example, the Johns Manville, Corporation is cooperating fully in this support of the development of this program in this one asbestos industry. Of course, there are other asbestos industries in which such programs have not come about.

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NARRATOR:

The major approach in the construction trades, which use asbestos in tremendous quantities, has been to try to contain the stuff so that asbestos fibers don't get into the lungs of asbestos workers, their families, or the general population. But that approach, simple as it sounds, has its complexities.

SELIKOFF:

Recognition of such complexity is essential to any efforts to manage the problem. Only simplistic approaches are invalid. There are really many aspects in the use of asbestos in the construction trades. For example, asbestos cement is still used. It is mixed with water to make the final finished product by simply dumping a fifty pound bag of this feathery, powdery cement into a large tub and adding the water. When this is done, a cloud of asbestos-containing dust is produced. We've simply worked out methods of mixing the material within a container so that no dust is created. Secondly, asbestos containing materials are cut and divided by power saws. It is simple and logical to enclose these operations and to put appropriate exhaust systems on these power saws so that the dust created doesn't enter the general airstream. Anti-dust materials, or dust suppressors, can be added to the materials used during the manufacturing process. This is now being done. Appropriate attention can be paid to solid-waste disposal. This was not even looked at until now simply because, by and large, it was not realized that this was a significant risk. Yet, it is perhaps one of the most important sources for this dust. Many different measures will be needed; no one single measure will be adequate. But all of these measures are certainly within the capabilities of our technology at this time. What is needed is the nerve to do it, the will to do it, the desire to do it. Unfortunately, such nerve, and such will, and such desire cannot come about automatically, and requires the interest and the consideration of many diverse groups in the community, including industry, labor, government, and other social groups such as scientists, academic groups, and so forth.

NARRATOR:

This has been the last of two reports on THE CASE AGAINST THE MAGIC MINERAL, featuring Dr. Irving J. Selikoff, Professor of Environmental Medicine and Chief of the Division of Environmental Medicine at the Mt. Sinai School of Medicine in New York City.

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