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to L. W. Saxby - T/27

from J. L. Konzen, M.D. - T/11

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subject ASBESTOS RELATED DISEASE

cc: D. M. Phillips - T/26
R. A. Yudkin - T/27
J. F. Vyverberg - New York

This correspondence is in response to a request to define asbestosis, the effect of smoking on asbestosis, mesothelioma of the lung, cancer of the lung, mesothelioma of the peritoneum, the effect of cigarette smoking and asbestos exposure on cancer of the lung and the effect of cigarette smoking on mesothelioma of the lung.

ASBESTOSIS:

Asbestosis is a result of over exposure to airborne asbestos fiber. It begins as an inflammation of the air sacs (alveoli) of the lungs. The air sacs are where air exchange between the lung and blood stream takes place. The first change in asbestosis is an inflammation of these air sacs and the final air conducting channels (respiratory bronchioles) which lead into the air sacs. This inflammation leads to thickening of the walls of the air sacs and eventual laying down of scar tissue between the air sacs (interstitial fibrosis). As the scarring progresses it involves the network of blood vessels which surround the air sacs eventually obliterating some of them. This leads to increased resistance to blood flow through the lungs and causes the right side of the heart to enlarge and eventually fail (cor pulmonale).

In summary, the basic lesion in asbestosis is a blocking of air movement from the air sac into the blood which is then complicated by hindered blood flow through the lungs. Death caused by asbestosis is frequently a result of the heart failure (cor pulmonale).

ASBESTOSIS AND SMOKING:

The process of asbestosis, as described above, also takes place in the smoker. In addition, the smoke can cause bronchitis which is an inflammation of the air conducting systems taking air to the alveoli. This can lead to a thickening of the wall of the air conducting systems, a change in the wall's architecture including the loss of cilia. Cilia are hair-like projections from the cell which aid in clearing foreign material from the respiratory tract. Smoking causes these cilia to be less active and in severe cases to be destroyed.

Further, smoking can actually affect the walls of the air sacs so that they dilate, some of them breaking down to form larger chambers which in turn results in loss of elastic tissue in the lungs (this damage to the air sacs and elastic tissue is emphysema).

The emphysema combined with the asbestosis is additive in damaging the lung.

MESOTHELIOMA:

Mesothelioma is a rare malignant tumor which can occur from natural causes but is seen in over exposed asbestos workers with marked frequency. At this time, it has not been possible to determine a dose response (how much asbestos for how long a time) for mesothelioma. However, there is little doubt that such a response does exist.

The mesothelioma is a malignant tumor of the envelope covering the lung (pleura). It is believed that the asbestos fiber somehow migrates to the pleural surface of the lung to cause the malignant change in the pleura.

A mesothelioma does not usually invade far into the lung nor does it travel to distant sites in the body (metastasize). It causes its devastating, rapid damage by literally encompassing the lung in a straight jacket preventing its functioning.

CANCER OF THE LUNG:

Cancer of the lung affects the air conducting systems (bronchi) by causing malignant changes in its surface cells or at other times affecting more distant structures such as the lung sacs.

Asbestos and smoking, in some unknown manner, work together as co-carcniogens causing cancer of the lung in far greater proportion of the exposed asbestos worker than in either a non-smoking asbestos exposed individual or a smoker not exposed to asbestos.

PERITONEAL MESOTHELIOMA:

Under the microscope a peritoneal mesothelioma looks exactly like a pleural mesothelioma. This is because the peritoneum, which is the envelope lining the abdominal cavity, is derived from the same embryonic tissue as the pleura.

At the present time, there is a continuing controversy as to how the asbestos comes into contact with the peritoneum. Some people feel that it migrates from the lungs by a route yet to be determined. Others feel that the asbestos (which is cleared from the lung by the normal lung clearing mechanism, which clears any foreign material, involves the unconscious movement of the foreign material into the throat, followed by swallowing of the material without the individual being aware of it) travels down through the GI tract and passes through the walls of the intestine to damage the peritoneum.

MESOTHELIOMA PRODUCTION AND CIGARETTE SMOKING:

At this time, there is no demonstrated link between cigarette smoking and mesothelioma production in either asbestos exposed or in asbestos non-exposed individuals.

If you have any questions or comments concerning these definitions and explanations, please let me know.

JLK:jgb

NOTE: Attached are questions and answers developed by Dr. D. J. Billmaier as a result of his briefing of the Berlin plant workers following Mr. Califano's statement in April 1978, concerning past asbestos exposure.

FINAL
DRAFT
11-28-78

QUESTIONS AND ANSWERS
CONCERNING ASBESTOS

Prepared by D. J. Billmaier, M.D., after question and answer sessions at the Owens-Corning Fiberglas Berlin, New Jersey, Plant.

Eight sessions were held May 10-12, 1978. Dr. Billmaier was present at the request of Richard S. Hite, Plant Manager. In addition to Dr. Billmaier and Mr. Hite, participants in the sessions included W. Russ Warmath, Personnel Director; Barbara Neill, R.N., plant nurse; John P. McNally, M.D., plant physician; and a majority of the hourly and salary work force.

Introductory Remarks: Several reports have appeared in newspapers and on television recently concerning the health effects of working with asbestos. These reports are a result of actions taken by Joseph Califano, the Secretary of Health Education and Welfare.

It is important to understand why Mr. Califano took such action. He made the following statements in his official press release:

"As part of my responsibility to promote and protect the public health, I am today announcing several steps to inform doctors, workers, and others about the increased health effects of asbestos exposure."

"The actions I am announcing today with respect to asbestos are based on a number of factors, but two of the most important are: the number of individuals affected who are unaware of the risk, and the fact that asbestos is one of the most dangerous and insidious substances in the workplace."

"Given the numbers of unaware individuals affected and the serious risks involved, it is imparative that HEW... protect the health of our citizens."

Anyone at Owens-Corning Berlin Plant who has worked with asbestos should know that they have worked with it. In 1971, Paul Scheuerle, the plant manager, talked with employees about health effects of asbestos using information given to him by Dr. Jon Konzen, the Corporate Medical Director.

The newspaper articles greatly increased the awareness of the Berlin Plant employees to the health problems of working with asbestos. The newspaper articles may also have contained information which the employees were not previously aware of.

Questions and Answers: Many employees raised the same question at each session; however, some questions were asked at only one or two sessions. The following questions and answers represent an attempt to summarize the main questions which were asked and answers which were given.

Note: There are two very similar words. Asbestos is a fibrous mineral. AsbestosIS is the specific disease which is caused by the mineral asbestos. These words should not be confused.

QUESTION: What diseases will asbestos cause?

ANSWER: Asbestos will cause asbestosis. It causes people to have a greater than normal chance of getting lung cancer, intestinal cancer, and mesothelioma.

QUESTION: Does asbestos in the lungs always cause disease?

ANSWER: Asbestos in the lungs most often does not cause symptoms of disease. The more asbestos there is in the lungs (which depends how long the person worked with asbestos and how much asbestos was in the air he breathed) will determine the chances of having disease. Also, people are different from one another and the same amount of asbestos exposure might cause disease in one person but not in another person. Doctors have examined the lungs of people who live in cities and found that many of them have small amounts of asbestos in their lungs. This probably comes from automobile brake linings or other asbestos products. Those people do not have any unusual types or amounts of lung disease.

QUESTION: What is asbestosis?

ANSWER: Asbestosis is a condiction of scarring of the lungs caused by asbestos. Normally the lungs are soft and spongy. If the lungs get scarred from asbestos they do not expand as well, so not enough air can get into the lungs. Also, this scarring may keep oxygen from getting through the air sacks of the lungs into the blood.

QUESTION: Why does asbestos cause asbestosis?

ANSWER: A very simple explanation is that asbestos fibers are small enough and fine enough to get way down into the lung. When such fibers do get into the lung, they scratch or irritate the inside of the lungs and the cells in the lung form scar tissue.

A little more scientific answer is that there are certain types of cells (macrophage) which normally eat up foreign materials and protect the lungs. When a long thin fiber of asbestos gets into the lungs, the cell tries to eat the fiber, but instead the fiber spears the cell and kills it. When other cells come to help, they are also killed. As a result of this process scar tissue is formed.

QUESTION: Can a chest x-ray show asbestos fibers in the lungs?

ANSWER: A doctor cannot see asbestos fibers on an x-ray film. He sees shadows of the lungs and looks for changes caused by asbestos. Very early changes may be difficult to distinguish from the shadows in a normal lung. Later changes may be very specific for asbestosis. At times the doctor may find shadows indicating other types of disease in the heart or lungs not due to asbestos.

QUESTION: Is a chest x-ray to look for asbestosis different from other chest x-rays?

ANSWER: Almost all chest x-rays are taken so the doctor can mainly look for disease in the lungs, but also to look for some disease in the heart. This is the kind of chest x-ray that Berlin Plant employees have been getting and the kind a person would get if he went to his own doctor or a hospital. If the doctor were especially concerned about heart disease or if he wanted to look for a broken rib, he might ask for a different kind of chest x-ray.

QUESTION: Does getting a chest x-ray cause harmful exposure to radiation?

ANSWER: Everybody gets "background" radiation from the sun and from other materials around them. The amount of radiation a person gets from a chest x-ray is small compared to this, and will not cause any bad health effects.

QUESTION: How does a doctor make a diagnosis of asbestosis?

ANSWER: The doctor puts together information about a person from his work history of asbestos exposure, the chest x-ray results, lung function tests, and physical examination, especially listening to the lungs for certain breathing sounds. If the doctor finds certain things abnormal in these areas, he can make a diagnosis of asbestosis.

QUESTION: What are the symptoms of asbestosis?

ANSWER: Any disease of the lungs including asbestosis may cause cough and shortness of breath. It would be unusual for asbestosis to cause chest pain. Oftentimes the effects of asbestos on the lungs can be found by medical testing before a person has any symptoms. Rather than worrying about symptoms, the employee should discuss his concerns with the plant physician.

QUESTION: How does a doctor determine the amount of disability?

ANSWER: Doctors Gansler and Wright have written out standards to judge the amount of lung disability (Archives of Environmental Health, February, 1966). The doctor uses these standards, and based on a person's symptoms, chest x-ray, lung function tests, and capability for working or exercising, he determines the amount of disability. There is an element of judgement in this determination and one physician's opinion may be different from another. The Gansler and Wright criteria were set up as an effort to be fair and to get doctors to agree as much as possible.

QUESTION: Will the percent disability get worse? How much, and how fast?

ANSWER: Once asbestos gets in the lung it does not get out. The disease caused by asbestos will not get better and may get worse. How much or how fast this will happen cannot be predicted for any individual, but does depend in general on the amount of asbestos and length of time the person has been exposed.

People may have diseases other than asbestosis; for instance, bronchitis due to smoking. If a person has symptoms due to these other diseases and they can be cured or helped, for instance by stopping smoking or treating lung infections, a person could get better.

The doctor cannot predict how much disability any one individual will have nor can he predict how fast the disability will progress. Some people, and we would expect that most people at the Berlin Plant, will have a relatively slow progression of their disease based on the types and amounts of exposure they have had.

QUESTION: How can a person have 0% disability?

ANSWER: Even if asbestos causes scarring in the lungs and the doctor diagnoses asbestosis based on history, chest x-ray, lung function tests, and listening to the lungs, the lungs have a great deal of reserve capacity. Until this reserve capacity is used up, a person could have no symptoms and be able to work or exercise normally.

QUESTION: What is cancer?

ANSWER: Cancer occurs when one part or tissue of the body (for instance, lung, bone skin, intestine, etc.) produces an abnormal type and amount of cells. A lot of abnormal cells grow out of control, as if the shut off mechanism is not working.

QUESTION: Will I get intestinal cancer?

ANSWER: Again, there is no way to predict who will or who will not get cancer. The chances of getting intestinal cancer are somewhat greater in asbestos workers with high exposures compared to non-asbestos workers.

QUESTION: What is mesothelioma?

ANSWER: Mesothelioma is a rare cancer of the lining of the lung or the lining of the intestine.

QUESTION: What about the family of an asbestos worker or people living around asbestos plants, can they get any diseases from asbestos?

ANSWER: Whether or not an individual gets asbestosis, lung cancer, or intestinal cancer from asbestos is related to how high an exposure he had and how long he worked with it. It is extremely unlikely that any family member would have a high enough exposure to asbestos to get any of these diseases from that exposure.

The newspaper article mentioned that family members could get diseases. What the newspaper article was talking about was mesothelioma. Family members do have a much higher chance of getting mesothelioma. However, since mesothelioma is such a rare tumor it is extremely unlikely that any family member of a Berlin plant worker would get mesothelioma. For instance, the normal amount of mesothelioma might be one case among 2 million persons, but among families of asbestos workers there might be one case in 200,000 persons.

QUESTION: Does asbestosis lead to lung cancer?

ANSWER: There is an increased risk of lung cancer in workers exposed to asbestos. Although asbestosis indicates exposure to asbestos, a person with asbestosis does not necessarily have any greater chance of getting lung cancer than a fellow worker exposed to asbestos but without asbestosis.

QUESTION: Can asbestos get into the body through the pores of the skin?

ANSWER: No it cannot. Asbestos can cause asbestos warts, and asbestos warts will not turn into cancer.

QUESTION: Can asbestos get into the blood?

ANSWER: Asbestos fibers may be small enough to get into the lung and very complicated research has shown that a few fibers may be small enough to get from the lung to the blood. Such fibers do not have an affect on the health of the worker.

QUESTION: Can asbestos damage the heart?

ANSWER: Asbestos can cause lung disease. The heart works with the lung to get oxygen from the air into the body tissues. If a person has heart disease and asbestosis, the one condition may make the other condition worse. In some cases, severe lung scarring from asbestos can make the heart work harder. Asbestos will not get into the heart and directly damage the heart not will asbestos cause hardening of the arteries or heart attacks.

QUESTION: What kind of medical tests should be done if a person has worked with asbestos? What good are these tests?

ANSWER: The following are useful in detecting early effects of asbestos:

1. Chest x-ray: This can detect lung scarring from asbestos. It may help to detect lung cancer early, which may then be able to be cured by surgery.

2. Spirometry or breathing test: This tests how much air the lungs can hold and how fast a person can blow out his air. Like the chest x-ray, it may find disease other than disease due to asbestos.

3. Tests for hidden blood in stool: Cancer in the intestine may give off very small amounts of blood which a person wouldn't recognize. A special test can be done to look for this hidden blood. If a test is positive, it does not mean a person has cancer, but the person needs further tests.

4. Rectal Examination: Most cancers of the large bowels occur near the rectum and these tumors could be found by a rectal examination.

QUESTION: Why did it take so long to learn about the diseases caused by asbestos?

ANSWER: Asbestos began to be used widely in the late 1800's. The first article about asbestos disease was written in 1910. Not much was known about asbestos even in the early 1960's. In 1964 the government Bureau of Occupational Safety and Health published a book which said about asbestos "Conflicting opinions and differences in reports make it difficult to confirm or deny conclusively a causal relationship between asbestosis and cancer of the lung or extrapulmonary tissues. However, there is increasing evidence to suggest that such a relationship exists." The real concern for asbestos began in the late 1960's. A large reason for the delay was that diseases caused by asbestos take 15, 25, or 35 years to develop.

QUESTION: Will the things we are working with now cause disease or cancer 30 to 40 years from now?

ANSWER: The chemicals and substances used now have been around a long time and have been studied extensively. They do not have the bad effects that asbestos has.

Silica is a batch material which can cause lung scarring, but not cancer. Workers should wear respirators while working with batch materials.

The Rayon used in batch is a manmade fiber. It is too large to get into the lungs, and, therefore, cannot cause any disease.

QUESTION: Is it bad to breathe dusts?

ANSWER: There are different kinds of dusts. Dusts which cause scarring or bad effects in the lungs are called toxic dusts. Dusts which do not cause bad effects or lung scarring are called nuisance dusts. For instance, limestone is calcium carbonate, a dust which can cause an irritation of the eyes, nose, and throat. However, if it is small enough to be breathed into the lungs, the body can break it down. Calcium is a part of normal bone and carbonate is like the carbon dioxide which you breath out.

In order to be breathed in the dust must be small enough to get into the lungs. The average human hair, a "fiber", is 65 microns in diameter.

Dusts which are round, or almost round, must be less than 10 microns in diameter to be breathed in. This is a very small particle of dust. Fibers must be less than 3 microns in diameter to be breathed in.

A Fiber is a particle which is three times longer than it is in diameter. In order to cause bad health effects, the fiber must be even thinner, less than one micron, and very long. Asbestos fibers are this size, fiberglass and rayon are not.

QUESTION: Is there a danger from the asbestos in the walls and in the ceilings?

ANSWER: The asbestos in these locations generally is covered up and stays there. However, it will not stay forever. If renovation or construction work is done and the asbestos containing material needs to be ripped out, respirators and proper protective clothing must be worn and proper procedures for tearout, cleanup, and disposal of this material must be followed.