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DU PONT'S ASBESTOS DETECTION PROGRAM

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Good morning. It's a pleasure to be here at this most important meeting. And Nashville is certainly gorgeous this time of the year too.

This annual meeting offers a unique opportunity for occupational health professionals to examine many of the critical public issues of the day.

Today, I'd like to talk about the efforts of my company, Du Pont, in detecting the hazards of asbestos exposure. I'd like to describe for you the parameters of our program and discuss some of the obstacles we have faced in fully implementing it.

The nation's concern about the health risks posed by asbestos exposure isn't new, but I think we will all agree that our sensitivity to that issue has been enhanced immeasurably over the past several years.[1]

Increased litigation and media interest have attracted considerable attention to persons who may have worked with or may have been exposed to asbestos or asbestos insulation.

However, before I discuss Du Pont's program, I'd like to talk about asbestos generally, provide a bit of background on its development and use, and detail just a few of its biological and clinical effects.

Asbestos, derived from the Greek word asbestos meaning "not extinquishable,"[2] describes a group of fibrous minerals and hydrous silicates of magnesium and other metals which are used in a variety of industrial and domestic products. As suggested by the Greek description, asbestos is resistant to heat and acids and virtually indestructible. These properties give asbestos unique physical and biological characteristics.

Asbestos is ubiquitous throughout our culture -- it's in gaskets, brake linings, caulk, paint, cement, wallboard, insulation, undercoating material and numerous other uses.[3]

Asbestos has a long history. The ancient Egyptians used asbestos initially to make pottery and noncombustible lamp wicks and other products which require fireproof components.[4-6]

The major varieties of asbestos are chrysotile, crocidolite, amosite, and anthophyelite.[4] Chrysotile, which is a white, usually long, silky fiber, comprises 95 percent of the asbestos used commercially.[2]

Differences in the physical characteristics of the various asbestos fibers determine their commercial usefulness. For example, chrysotile lends itself to incorporation into textiles, while crocidolite and amosite; which are more acid resistant, are valuable in marine insulation.[7]

Speil and Leineweber have shown that these differences in the physical properties of the fibers account for variations in the health effects of exposure. They argue that "only by relating experimental biologic evidence with the variations in

physical size and form... can we ultimately arrive at valid medical conclusions." [7]

The most frequently recognized asbestos-related abnormality is pleural thickening, [8-12] which may result from a number of other causes, i.e., infection and chest trauma.

Pleural thickening is thought to be caused by asbestos fibers that have apparently worked their way through the lung tissue and have been stopped by the tougher pleural layers. [3]

Pleural thickening can be seen in x-ray films. [3] It is usually limited to the parietal pleura and causes no physical symptoms. Pleural thickening is not considered a disease, [13] but rather an abnormality. It is frequently found alone, with no adverse medical effects and no disability. [13]

Persons with asbestos-related pleural thickening may have a somewhat higher risk of contracting mesothelioma, a rare cancer of the pleura and peritoneum.

Asbestos induces interstitial fibrosis of the lung, in the disease called asbestosis. [14] The specific mechanism is not well understood but some consider it an immune response to the presence of asbestos fibers in the lung tissue. Fibers less than 10 microns in length are readily ingested by macrophages in the lung and some studies have suggested that longer fibers may induce alveolitis and subsequent fibrosis because the length of the fiber prohibits its complete ingestion by the macrophage. [15] Asbestosis, however, is always associated with the presence of asbestos fibers in the lung tissue. [14-16] X-rays in

asbestosis cases demonstrate interstitial fibrosis almost always in the lower lobes.[16,17,18] This fibrotic condition decreases elasticity of the lungs and interferes with blood-gas exchange. The disease may progress with a disabling loss of lung capacity, dyspnea on exertion, chest pain, rhonchi,[19] etc., or it may remain stable for long periods with very little symptomatology.

The onset of asbestos-related diseases, such as asbestosis or mesothelioma, is usually gradual,[20] involving a latency period of often fifteen years or more between the time of first exposure to asbestos and the development of the disease. However, persons with asbestosis have a significantly higher risk of developing lung cancer, particularly if the person smokes.[21-24]

Symptoms associated with mesothelioma (peritoneum or pleural) may include weight loss, chest pain, breathlessness. There may also be excessive fluid accumulation in the abdominal or pleural cavities.

Smoking as a factor in carcinoma of the lung has been fairly well established.[21-24] In one study, Dr. Irving Selikoff and his group at the Mt. Sinai School of Medicine calculated that asbestos insulation workers with a history of regular cigarette smoking had eight times the risk of dying of lung cancer as did cigarette smokers who did not do such work, and about 90 times the risk of men who neither worked with asbestos nor smoked cigarettes.[24] It is not yet well established whether asbestos inhalation increases the risk of lung cancer among nonsmokers.

It is generally believed that airway obstruction is not a feature of asbestosis.[26-28] Although a review of 375 published cases of Quebec asbestos workers in 1975 by Becklake and Faurnier-Massey[29] indicated that a sizable number of patients had airway obstruction (11 percent compared to 39 percent with a restrictive pattern), there is little clear evidence to date which shows an excess of airway obstruction in asbestos-exposed populations compared to those not so exposed.[27,30] Eight researchers, in an article for the Archives of Environmental Health,[31] say there is no clear evidence that, within exposed populations, the prevalence of obstruction increases with increasing exposure. In addition, the study found that the restrictive patterns of lung function do not show an increased prevalence in relation to exposure.

There are a number of clinical signs and symptoms that we need to be aware of in diagnosing asbestos-related disease. Many physicians believe basal crepitations are the earliest sign of asbestosis.[3] Cough, dyspnea, clubbing, sputum, chest pain, impairment of respiratory function and cyanosis are among the other signs of asbestos disease.

Now I'd like to talk about Du Pont's effort to identify asbestos-related abnormalities and diseases.

Du Pont's asbestos screening program is designed to detect signs of lung abnormalities in our 135,000 U.S. employees and pensioners which may have resulted from their exposure to asbestos while they were working for the company.

Although we had a program to identify asbestos-related abnormalities, the need to accelerate our asbestos-detection efforts became quite apparent when a number of asbestos-related abnormalities were detected at Du Pont plants in Delaware and New Jersey. That experience heightened our awareness that comprehensive diagnostic techniques are required to detect early signs of asbestos-related abnormalities.

But, just as importantly, it demonstrated to us the extent to which some of our employees may have been exposed to asbestos. Our increased sensitivity toward and understanding of asbestos-related abnormalities and diseases have made it possible for us to identify signs or findings which may have previously gone undetected. We, likewise, want to make sure that our employees are fully aware of whether they have been affected by asbestos, so our corporate policy is to inform employees and pensioners of abnormalities we detect.

Last October, as we intensified our detection program, all U.S. Du Pont plants began a comprehensive review of medical histories of high-risk employees -- those who were 40 years of age or older with 10 years' experience at Du Pont in jobs where they may have been exposed to asbestos dust through work with insulation material or in manufacturing operations. The program was subsequently broadened to include all U.S. Du Pont employees.

In May of this year, we expanded the program to include the company's more than 30,000 pensioners. All pensioners have been contacted by mail and invited to have chest

x-rays taken at company expense if they believed they had been exposed to asbestos during their career at Du Pont or if they were unsure of possible exposure. Obviously, the involvement of our pensioners in the screening program has been totally voluntary.

Under our program, chest x-rays of all employees are now being reviewed as part of our existing routine periodic physical examination program. We began working with consulting radiologists in 1977, and Du Pont now requires that all radiographs be read by a board-certified or qualified radiologist.

In addition, most of our plant physicians have recently completed an internal Du Pont training course designed to assist them in the early detection of lung abnormalities. As a result, our company physicians have clearly become more sensitive to asbestos-related abnormalities. This special training, we believe, will help ensure that our company physicians can properly evaluate signs of asbestos exposure. We also find that our plant physicians are, in many cases, having to help bring the local radiologist up to our level of expected capability in detecting asbestos-related changes.

We do not expect to complete our assessment of asbestos-related abnormalities among active employees until the end of the year, so I won't be able to share our findings with you today.

We have found, not surprisingly, that the jobs primarily involved in our asbestos-related cases thus far are

maintenance positions such as insulators, pipefitters, laggers, mechanics, millwrights and machinists. [15]

As you are aware, no medical treatment generally is indicated for asbestosis or asbestos-related abnormalities. [3] While present medical knowledge considers asbestos-related abnormalities to be irreversible, they do not necessarily develop into asbestosis or cause physical impairment.

Studies have shown that the development and progression of asbestos-related abnormalities are dependent upon such factors as dose, length of time from first exposure, and life style. [32]

However, all possible work-related cases are referred to a pulmonary specialists at company expense for evaluation and consulation. As I mentioned earlier, the plant physician strongly advises that smokers with an asbestos-related abnormality or asbestosis stop smoking immediately, since it increases the possibility of asbestos-related disease and lung cancer.

Employees with an asbestos-related abnormality are offered follow-up examinations annually or at an interval prescribed by the pulmonary specialist. These examinations are designed to detect pulmonary disease and to determine whether there is any impairment that may require a change in work assignment.

If any Du Pont work-related illness or impairment develops, Du Pont accepts responsiblility for appropriate

related medical costs, compensate the employee or his family as provided for under the Worker's Compensation laws, and assist the employee or his family in obtaining other benefits to which they may be entitled, such as disability allowances, Social Security and appropriate retirement benefits for those eligible.

Cases of asbestos-related lung abnormalities which we are currently identifying through our screening program actually resulted from exposure to asbestos 15 to 35 years ago, at Du Pont or in previous employment, when the potential danger of handling asbestos insulation was not fully understood.

Since the early 1970's installation of asbestos-bearing insulation has been stopped in all of our plants. Other uses have also been stopped except where absolutely necessary. Programs to replace it with non-asbestos insulation material began at some sites as early as 1971. Since asbestos insulation poses minimal problems unless it is disturbed, we are replacing it where possible when it is being removed for other reasons, such as overhauls.

In addition, our plants have written procedures on safe methods of handling asbestos-bearing insulation and our sites routinely monitor exposure levels in the workplace, provide regular medical examinations, and provide protective clothing and equipment to eliminate potential exposure to asbestos.

Our Engineering Department has provided a manual to all plant sites describing the hazards of asbestos, work

practices and controls necessary to minimize fiber exposure and air sampling.[15]

Many of our plants also have an ongoing educational program to inform employees of all possible health hazards which are associated with asbestos.

Too frequently, our employees ask us -- and rightly so -- why it sometimes takes us two to three years to advise them of asbestos-related abnormalities.

Frankly, the abnormalities we are discovering now are being detected because we have a better knowledge of, and sensitivity to, asbestos-related abnormalities, and we are using more advanced x-ray equipment and film at our plant sites.

Despite these efforts, we are faced with a most pressing dilemma -- the high variation in diagnostic radiology in the diagnosis of asbestos-related abnormalities. Many authors have studied this issue and, not surprising, all have concluded that a large number of possible abnormalities are either misinterpreted, not detected, or not reported. Error or variation rates in these studies have ranged from 20 percent to 50 percent.[33]

The most recent study, which appeared in the June edition of the Western Journal of Medicine, was authored by Drs. John Forrest and Paul Friedman. In it, they report that a review of chest radiographs of 143 lung cancer patients over a two-year period showed that doctors had missed 22 out of 78 cases for whom there was clear evidence of lung cancer on the films.[33]

In addition, there were five cases in which the findings were misinterpreted, bringing the total number of errors to 27.

The two University of California radiologists document a problem we have experienced at Du Pont. In 15 of 27 patients surveyed by them, the time from first radiologic appearance to diagnosis was longer than six months and in two instances it was more than three years.

This report of delays of months or years after the first definite radiologic evidence of a mass has been confirmed by a number of other studies. Let me just mention a couple.

Dr. Gail Eyssen, in an article in Chest, detailed the findings of her study of about 300 men who had been employed in Quebec's asbestos industry.[34] These men were selected from a group of over 11,000 who had worked wholly or predominately in chrysotile mining and milling.

Dr. Eyssen collected the most recent film available to 1971, together with four earlier films taken at intervals of about five years. Each set of films was assessed, side-by-side in known sequence, by five readers working separately. Each reader had been active in the development of International Labor Office (ILO) U/C (1971) classification since 1966. ILO standard films were available to each reader. The results were not surprising. The readers differed considerably in the number of subjects who were eligible for "attack." The proportion varied from 53 percent to 97 percent. The readers also

differed in the proportions attacked among those eligible, ranging from 24 percent to 96 percent.

And the study by Amandus et. al., published in the American Journal of Roentgenography,[35] disclosed classification differences ranging from 19 to 86 percent among four readers who had reviewed more than 900 chest roentgenograms of Appalachian coal miners.

What does this mean?

Well, in our view, it suggests strongly that the state of the art of diagnostic radiology still needs considerable improvement.

We have found that our x-rays are perfectly acceptable for most diagnostic purposes but a few are of insufficient quality for detecting early asbestos-related changes. This inadequate quality of films has led to some variations in the reading of our x-rays. We now use an x-ray film-screen combination that enhances our ability to detect early abnormalities. In addition, we have an on-going program where representatives of our x-ray sales technical staff visit all plant sites to assist them in the evaluation of the quality of the films.

In 1979, Du Pont issued guidelines to insure that all x-ray films are evaluated by a qualified radiologist. Earlier this year, radiologists at the University of Cincinnati reviewed radiographs from a number of our plant sites as part of our quality assurance program.

Although we don't know the results of our asbestos screening program, I believe this case study does demonstrate that asbestos-related abnormalities may be more prevalent than previously suspected. Du Pont's commitment to detect, inform and evaluate all our employees for possible asbestos-related abnormalities and to eliminate potential hazards at our plant sites places us toward the forefront of the asbestos issue with its consequent publicity and vulnerability.

Nevertheless, we recognize our responsibility in this regard. We, and all companies, have an obligation to act responsibly in light of our knowledge of the potential hazards posed by asbestos and our current efforts to define the magnitude of these hazards. We take that responsibility seriously and I can assure you we fully intend to meet that challenge for the benefit of our employees and in the best interest of our company.

Thank you.

PHWJ
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