

ASBESTOS RELATED DISEASES

J. FODERARO

Until the early 1950's asbestos was thought to be an inert material which did not cause any problem; although asbestosis was first described in 1906 in England and in 1930 in the U.S. and an association between asbestos exposure and lung cancer was noted as early as 1935, the fact that asbestos exposure could result in serious health problems was not widely accepted until much later.

It should be noted that large scale use of asbestos did not start until close to the end of the last century. This is important since in most cases diseases resulting from exposure to asbestos do not become evident until many years after the exposure begins, in some cases up to 40 years.

There are three disease entities which result from exposure to asbestos.

1. Asbestosis
2. Mesothelioma
3. Cancer of the lung and other sites

Asbestosis is a chronic lung disease in which the lungs become slowly scarred and inelastic and the pleura (the outer surface of the lung) becomes thickened and sometimes calcified. The exact mechanism of asbestosis is unknown, but we believe that asbestos fibers are inhaled, and become trapped in the small air sacs in the lungs. The movement of the lungs during breathing causes the fibers to work their way into the lining of the bronchial tubes where they create a chronic irritation. The body's defense mechanism deposits various materials around the fiber in an attempt to destroy it or remove it. This is not possible and leads instead to the formation of a so called asbestos body. The chronic irritation continues and eventually scarring develops around the "asbestos bodies". The ultimate condition of the lung is one of severe emphysema.

The disease develops slowly over the years and often continues to increase in severity even long after the exposure to asbestos has stopped.

The effect on the patient is a progressive restriction of his ability to move air in and out of his lungs, and the ability of gases to be exchanged in the lungs, so that the body tissues are provided little oxygen and are unable to adequately eliminate carbon dioxide.

The patient becomes progressively short of breath, and ultimately succumbs to intercurrent pulmonary infection or as a result of heart failure.

There is no effective treatment other than to provide some relief by restricting activities and providing temporary relief with oxygen and other respiratory aids.

DUP 0907491

Mesothelioma is a tumor which involves the lining of the cavities of the body, primarily the lining of the chest cavity, both the outer surface of the lung and the inner surface of the chest wall. It is also frequently found in the abdominal cavity, and in the cavities around the heart and the testicles.

Mesotheliomas are not very malignant tumors in that they do not have a great tendency to invade surrounding tissues, or to spread to distant sites, but they do

There are two distinct types of mesothelioma, localized and diffuse. Most of the localized mesotheliomas can be successfully resected and there is no tendency for them to recur. There has been no association demonstrated between exposure to asbestos and the localized type of mesothelioma.

The diffuse type begins in multiple areas within a body cavity. These "seedlings" grow laterally and finally coalesce and completely line the body cavity. If the lung is involved, expansion of the lung is restricted. At the same time they slowly invade the chest wall and result in severe pain. There is no effective treatment and death usually results in one year.

An association between diffuse mesothelioma and asbestos exposure was first described in 1960; since then several other epidemiological studies have confirmed this association.

Some epidemiological works shows excesses of diffuse mesothelioma even among members of the family of exposed workers and in the neighborhood of industrial sources of asbestos.

The disease has been induced in experimental animals both by inhalation and by injection of asbestos in the chest cavity.

The disease has also been induced in the chicken by a virus, suggesting that possibly asbestos acts by activating such a virus which then induces mesothelioma. This is still highly speculative.

The interval between the onset of exposure and development of the disease is long and is dose related. The average is said to be 30 years but varies between less than one year to 50 years.

There is no evidence of any association between cigarette smoking and mesothelioma.

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Cancer of the Lung and Other Sites

Cancer of the lung and other sites, specifically the gastrointestinal tract and the larynx is the third type of disease associated with asbestos exposure.

The suspicion of an association between asbestosis and lung cancer was first published in 1935, but convincing evidence of such an association did not appear until 1955. As late as 1960 a standard textbook on occupational medicine stated: "Some authorities believe that asbestos may induce bronchogenic carcinoma, but as yet there is no impressive body of evidence to support this assumption."

In the middle sixties Selikoff investigated the mortality experience of insulation workers and concluded that the death rate from cancer of the bronchus and pleura was 6.8 times as high as that for the general United States white male population and cancer of the stomach, colon, and rectum was three times as common. Cases of mesotheliomas and asbestosis were also found in this group. The lung cancer risk in this group was dose related. Some increase in lung cancer was seen in workers with less than 3 months exposure. An increase in cancer incidence was seen as little as 10-14 years from the onset of work exposure, but the greatest increase occurred 30-45 years from the onset of the work exposure. When cigarette smoking was taken into account, it was also calculated that asbestos insulation workers with a history of regular cigarette smoking had eight times the risk of lung cancer deaths compared with cigarette smokers who did not do such work, and approximately 90 times the risk of men who neither worked with asbestos nor smoked cigarettes.

For non-smokers there was no clear indication that asbestos exposure resulted in an increase in the risk of lung cancer.

In the seventies there have been several other studies indicating an association between lung cancer and exposure to asbestos, practically all supporting a dose related response.

A dose related response has also been observed in the case of digestive system cancer.

Lung tumors have been induced in experimental animals by inhalation with exposures as short as one day.

All types of asbestos have been demonstrated to be able to produce both asbestosis and tumors; some however are more potent in inducing one response than the other.

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DUP 0907495

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B. R. Bolton	Nemours	Safety & Fire	3646
H. S. Trigg	Wilm.	Legal	6637
E. E. Baldwin	Waynesboro	Engineering	2800
A. B. Culver	Seaford	Field Maint.	7298
W. C. Looney	Camden	Safety/Health	3461
B. E. Panson	Camden	BCF Eng. Area	2591
W. D. Springs	Cape Fear	Engr. Spec.	4488
W. L. Stenger	Cape Fear	Environ. Cont. Supvr.	4223
L. E. Williams	Kinston	Environ. Cont.	6582
Carroll Wiggs	Kinston	Field Maint.	6544
B. R. Vaughan	Kinston	Insul. Super.	6634
K. K. Bailey	Waynesboro	Insul. Supvr.	2781
R. W. Calhoun	Seaford	S&F Prot. & OSHA	358
D. L. Swats	Martinsville	Area Maint.	2302
W. D. Whitlow	Martinsville	Safety	2343
O. E. Fitzgerald	Martinsville	Safety Supvr.	2348
G. E. Lang	Louviers	Materials Engg.	3435
J. R. Brown	Old Hickory	Chief Supvr.	7612
W. G. Roberts	Old Hickory	Section Supvr.	6722
E. T. Ruehl	Waynesboro	Safety, Health, Env. Affairs	2139
L. R. Robertson	Old Hickory	Env. Control	6180
A. V. Episcopo	Chestnut Run	Safety-OSHA	3512
W. J. Montgomery	Chestnut Run	Area Maint. Supvr.	3325
J. Mooyman	Maitland	Maint. Forem.	406
K. Ash	Kingston-Ontario	Maint. Foreman	681
J. E. Wright	Chattanooga	Area Maint. Supv.	1453
C. A. Smith	Cooper River	Area Maint. Supv. -Staple	9190
W. W. Dowdy	Chattanooga	Env. Cont.	7237
L. R. Moss	Spruance	S. H. E. A.	2104
T. J. Hampton	Spruance	Engr. Supv. -Field	2940

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EXHIBIT # Line 25

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DUP 0907498