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ASBESTOSIS AND LUNG CANCER

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The course of pulmonary asbestosis is so well known and researched as an occupational disease, in asbestos workers, that we can no longer expect new results in this direction. On the other hand, more experience must be collected regarding its pathogenesis and its combination with other pulmonary diseases. The author showed, based upon a large number of patients, that, for example, the association with pulmonary tuberculosis is much more rare than that observed in the case of silicosis. Asbestosis shows no noteworthy influence on the frequency and course of tuberculosis in the lung. The correlations to pulmonary cancer are quite different since it is often observed in conjunction with this coniosis. We are faced here with a new occupational cancer (tr. note: last sentence of abstract not furnished with paper)

At present the following experience has been reported in world literature. Gloyne 1933 was the first to observe a pleural carcinoma in association with asbestosis. In 1935 he reported 2 further cases, while another followed in 1936. Two years later he found 6 pulmonary carcinomas in 50 autopsies of patients that had died of asbestosis. Between 1935 and 1941 detailed individual observations were reported by Lynch and Smith, Egbert and Geiger, Nordmann, Wedler and Wedler and Linzbach. Recently 2 malignant pleural neoplasms were observed by Teutschlander and Alwens and Fischer-Wasels.

A summary of malignant tumors of the lungs and pleura confirmed at autopsy of patients that died from asbestosis shows that, for example, in Germany, one bronchial cancer and 2 malignant pleural tumors are determined in every 29 autopsies. This equals a rate of approximately 20%. In England, where the number of autopsies of asbestosis patients cannot be surveyed so dependably in the literature as is possible in Germany, Gloyne's observations show a 12% rate. In the American literature, I found 2 bronchial cancers in reports on 13 autopsies. No further positive experience could be gained in literature from Italy, France, and other countries. Fourteen malignant pulmonary and pleural tumors were found in 92 autopsies conducted on asbestosis patients in the latter group. This equals a rate of 16%.

For the determination of pulmonary cancer as an occupational disease, an attempt must be made to find a pathogenic explanation based on its statistical frequency in cases of asbestosis, its animal-experimental reproducibility and its behavior when associated with the basic disease. The statistical frequency of pulmonary carcinomas in cases of asbestosis is demonstrated above. The average of 16% is far greater than the quotient of pulmonary carcinomas found in large scale autopsy statistics. The average value in these statistics is approximately 2-6%.

Nordmann and Sorge were successful in obtaining an animal-experimental clarification of this question. We must await further results of experiments in this field. The following peculiarities of cancers associated with asbestosis should be pointed out: To the extent that the material available for study can be correlated statistically the sexual distribution shows

that females are relatively frequently affected. The otherwise normal ratio of 3-4:1 is shifted toward the females, whereby it should be noted that females are in a majority in most asbestos plants. Among those patients with cancer we find a number of relatively young people between 35 and 41 years of age. The localization of the tumor is very often the same as that of the most severe asbestosis alterations in the inferior lobes of the lung.

The histological character of these carcinomas, which represent principally squamous cell carcinomas, deviates significantly from the normal numerical distribution of pulmonary carcinomas according to their cellular structure. The development of cancer in asbestosis always requires a relatively long duration of action of the dust. Both the duration and intensity of exposure influence these developments. A prolonged dust-free interval between asbestos work and the onset of lung cancer is observed in many institutes. The time between the onset of work in air contaminated with asbestos dust and the determination of the neoplasm was 12-42 years in our material. These observations are quite reminiscent of other occupational cancers studied.

Our understanding of the frequent occurrence of pulmonary carcinoma in asbestosis is based on the following circumstances: the mechanical and probably also chemical effects of asbestos dust lead to a general neoplastic tendency in the lungs, with proliferation of the connective tissues, epithelial desquamation and reformation of the surface cells, macrophages, and foreign body giant cell formation, as well as epithelium metaplasias of the bronchial mucous membrane. The damage which leads to a disruption

of the normal tissue relationships is never so significant that it causes cell death. Metaplasia of the bronchial mucous membrane together with infectious reactions appear to represent the precursor stages of cancer development. As in all occupational cancers, we must postulate the existence of a general predisposition in this case, because only a certain percentage of patients afflicted with asbestosis developed cancer.

According to this experience, it is only proper that we classify pulmonary cancers associated with asbestosis as occupational diseases for insurance purposes.

Literature and further details can be found in the extensive study by the author "On Lung Cancer Associated with Asbestosis" to appear soon in Arch. klin. Med.

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ASBESTOSIS AND LUNG CANCER

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The clinical picture of asbestosis of the lungs as a job-related disease of asbestos workers, and its course, is known and has been investigated so thoroughly at present that we may not expect any significant new developments in this direction. However, as far as its pathogenesis and its combination with other lung diseases is concerned, we have still to compile further data. The author has been able to show by means of a comprehensive investigative material that it occurs, for instance, much less often in conjunction with tuberculosis of the lung than in the case of silicosis.

A possible influence of asbestosis on the frequency and the course of tuberculosis appears not to be worth mentioning. Different in this regard is the relationship to the cancer of the lung which can be found comparably often in coniosis. We are confronted here with a new form of job-related cancer. It is exactly this fact which must be considered to be of a more general clinical interest beyond the limited concerns of insurance laws.

In short, up to now the following experiences have been reported worldwide in the literature. The first one to make the observation of pleurocarcinoma in asbestosis was GLOYNE

in 1933. In 1935 he was able to write about two more cases which could be regarded as relevant. Another one was added in 1936. Two years later he had already found six cases of lung cancer among 50 dissections of cases with asbestosis. Further single data which could be considered relevant were published between the years 1935 to 1941 by LYNCH and SMITH, EGBERT and GEIGER, NORDMANN, WEDLER and WEDLER and LINZBACH. Finally, there were observed in Germany two further malign growths of the pleura by TEUTSCHLAENDER and ALWENS together with FISCHER-WASELS.

If we take together the secured data which have been confirmed by dissections, then we can find, for instance, among the 29 dissections which have been executed in Germany four cases of cancer of the bronchus and two malign growths of the pleura. This is in correspondence with a percentage of approximately 20 percent. In England, where the amount of dissections can not be ascertained as reliably as here [in Germany], it can be found from the figures of GLOYNE, a percentage of 12 percent. By going through the American literature I was able to compile two cancers of the bronchus out of thirteen dissections; the Italian and French literature as well as the rest of the literature do not contribute any further positive data concerning this matter. Accordingly, in a total of 92 dissections of cases of asbestosis, 14 malign growths of the lung and the pleura have been found. This

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establishes a percentage of 16 percent.

In order to prove that cancer of the lung is a job-related disease, the statistical frequency of its occurrence along with the lung disease in question must be determined; the best is to ascertain its reproducibility in animal experiments and to ascertain a behavior which can be deducted from the basic disease, including an attempt to explain it pathogenetically. The statistical acumulation of cancer of the lung in asbestosis has been attested to above. The average number of 16 percent is far above the usual occurrence of cancer of the lung as ascertained in the comprehensive statistics of dissections in which frequency is placed at approximately two to six percent.

The attempt to clear up this question by means of experiments with animals has been undertaken by NORDMANN and SORGE with positive results. We will have to wait for further results which are expected to be found by those means.

As far as peculiar traits of the cancer [owing to asbestos] are concerned, the following traits may be stressed. As far as the test results to which we have access can be statistically interpreted, the distribution is such that besides men also women are afflicted relatively often. The otherwise-common relationship of 3-4:1 has been changed in disfavor of the women; notwithstanding, one should consider that women's labor seems to be prevalent in most plants

dealing with asbestos. Among those afflicted with cancer were found a number of comparatively young people between the ages of 35 and 41 years. The location of the growths was in a conspicuous way in coincidence with the location of the greatest [tissue-]changes due to the asbestosis.

The histological character of the cancers, among which are prevalent plate-epithelial carcinomas, is different from the numerical distribution which can usually be found, as far as the structure of their cells is concerned.

In all cases the asbestos-lung needs a relatively long time in which the dust exerts its influence as its precondition. In this regard the extent and the intensity of the exposure to the asbestos can be substituted for each other, to a certain degree. An extended dust-free interval between the work with asbestos and the onset of lung cancer can frequently be found. The time span between the beginning of the work exposed to the dust and the time cancer could be proven was in all cases 12 to 42 years. In this we see clear allusions to other forms of job-related cancer.

An understanding of the acumulated occurrence of lung cancer along with asbestosis arises from the following circumstances: The mechanical influences and probably the chemical influences of the asbestos dust as well, leads to a general tendency of growth of the tissue in the lung, with an increase of the connective tissue, epitheldesquamation

and transformation of the covering cells, macrophages, formation of giant foreign body cells as well as epithelmetaplasies of the mucous membrane of the bronchus. The damage to the tissue which leads to a disturbance of the normal relationships between the cells is at no place so great that it would come to an actual destruction of the cell. Especially the metaplasis of the mucous membrane of the bronchus together with inflammatory reactions seem to represent a prestage of the development of cancer. We have to presuppose here, as well as with all job-related cancers, there is present a general predisposition to cancer because in every case only a certain percentage of the people afflicted with asbestosis develops cancer.

According to these experiences it is only right to conclude that cancer of the lung in conjunction with asbestosis must be considered a job-related disease.

Literature on the subject and more particulars may be found in the more explicit publication of this author, "About Cancer of the Lung in Conjunction with Asbestos" in Arch. Klin. Med. [Archives of Clinical Medicine.]

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