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THE ASSOCIATION OF CERTAIN CANCERS WITH ASBESTOSIS

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Introduction

Asbestosis is essentially an occupational disease of this century and prior to 1930 when the condition was first included in a Scheme for compensation in Great Britain, relatively few autopsy studies had been made.

The first case of lung cancer as a possibly associated condition was described by Lynch and Smith (1935) from the United States.

The first large series suggesting that the association of asbestosis and lung cancer was more

than one of simple chance was published in 1949 by Merowether, then H. M. Senior Medical Inspector of Factories in Great Britain. The series included 128 males and 107 females whose deaths were due either to asbestosis or where asbestosis was proved to be present at autopsy. The incidence of lung cancer in these two groups is shown in Table 1, reproduced from the Annual Report of the Chief Inspector of Factories for that year. In 22 of the male series and in 9 of the female series, cancer of the lungs was found to be present.

TABLE 1
Analysis of Asbestosis and Cancer of Lung as at 1947

Age in Years	Males			Females		
	Asbestosis	Asbestosis and Cancer of lung	per cent	Asbestosis	Asbestosis and Cancer of lung	per cent
15-24	3	—	—	6	—	—
25-34	9	—	—	33	2	6.1
35-44	30	—	—	41	4	9.8
45-54	36	9	25.0	17	1	5.9
55-64	37	11	29.7	6	—	—
65 and over	13	2	15.4	4	2	50.0
Total	128	22	17.2	107	9	8.4

The study was brought up to date in 1954 and again in 1955. By the latter year, the number of then known deaths from asbestosis covering both series had risen sharply to 365 while, of much

significance, the percentage of this group in which lung cancer was found had also risen from 13.2% to 17.8%, an increase occurring in both sexes.

TABLE 2
*Asbestosis and Cancer of the Lung as at 1955**

Diagnosis	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Asbestosis all cases	222	100	143	100	365	100
Asbestosis and Cancer of the Lung	48	21.6	17	11.9	65	17.8

* An additional 15 deaths have subsequently been allocated to the period up to 1955.

Doll (1955) has investigated the cause of death as determined at autopsy of 105 persons employed at one large asbestos works. Lung cancer was found in 18 of these, including 15 in association with asbestosis. A statistical study indicated that the risk of contracting lung cancer was of the order of ten times that experienced by the general population at that time.

Considerable interest has been expressed in these observations which do not seem to have been reported to a similar extent in other European countries or from America although South African experience is in greater harmony.

The Present Study

a. PULMONARY CANCER

British experience has been brought up to date to the end of 1962 in this paper. This has been possible, as in earlier studies reported in Annual Reports of the Chief Inspector of Factories, because in Great Britain asbestosis is a compensatable industrial disease formerly under a Workmen's Compensation Scheme, now as part of the National Insurance Scheme. Death benefit is also payable to eligible dependents. In practice, this means that a high proportion of cases are

recognised during life and, in the event of death, there is an autopsy examination. The diagnosis of asbestosis is then recorded on the death certificate and a study of these affords an unusually accurate means of determining the number of deaths from asbestosis and any associated pathology found at autopsy.

Between 1956 and the end of 1962, a further 169 deaths in which asbestosis featured, 135 males and 34 females, have been identified. In nearly every instance an autopsy was made and the clinical diagnosis confirmed. Fifty of the 135 now male cases also had a bronchogenic or lung cancer and 6 of the 34 female cases, percentage incidences of 37.0 and 17.6, respectively. These totals in this latter period exclude 5 cases diagnosed as mesothelioma of the pleura, all males.

The grand total of deaths in which asbestosis was known to be present during life or determined at autopsy to the end of 1962 is now 549, made up of 364 males and 185 females. These totals have been broken down in Table 3 into decades with the first period up to 1930 and the last to include the most recent period 1961-1962

TABLE 3
Incidence of Asbestosis and Asbestosis and Lung Cancer 1924-1962

Period	Males			Females		
	All Asbestosis	Asbestosis and Cancer of lung	% Cancer of lung	All Asbestosis	Asbestosis and Cancer of lung	% Cancer of lung
1924-1930	13	—	Nil	7	—	Nil
1931-1940	66	12	18.2	82	5	6.1
1941-1950	92	20	21.8	45	4	8.9
1951-1960	144	45	31.3	40	11	27.5
1961-1962	49	22	44.9	11	2	18.2
1924-1962	364	99	27.2	185	22	11.9

The point which immediately attracts attention is the rising percentage of cases in both sexes who had an associated lung cancer. The first lung cancers (one in each sex) were recorded in 1932, some time before those described by Lynch and Smith. The falling-off in the total of female deaths in which asbestosis was present is also noteworthy. Many of these females had employ-

ment relating back many years to past employment as mattress beaters before the hazard was properly appreciated.

b. OTHER CANCERS

Thirty cases in this complete series of 549 cases had a cancer found at autopsy arising from some other organ than the lung or bronchus.

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The distribution of these cancers was as follows:

Stomach	5 cases
Bowel	6 cases
Brain	1 case
Testis	1 case
'Abdomen', and ovary plus one case described as 'malignant peritonitis'	8 cases
Pleura or mesothelioma	9 cases
	30 cases

Four of the mesotheliomata of the pleura were found in the period 1961-62.

Discussion

It seems beyond question that there is a considerably greater risk of dying from lung cancer or mesothelioma of the pleura or (possibly) the peritoneum if asbestosis is present. The data, however, gives no information whether there is also an increased risk among workers using or exposed to asbestos who do not have evidence of asbestosis. The risk of acquiring an intra-thoracic neoplasm has apparently risen steadily over the period reviewed and the most recent group, the 49 males dying with asbestosis, confirmed during 1961 and 1962 included 26 or 53% with a lung tumour or mesothelioma. This increase must, however, be considered against a rising incidence of lung cancer in the population in general. Nevertheless, the proportion of males in the whole series in whom lung cancer was present amounted to 27.2% and of females 11.9%. By comparison, in 1961, which year represents the highest incidence yet recorded in the general

population, 7.4% of male deaths were due to intra-thoracic cancer and 1.3% of female deaths.

It is tempting to speculate on a possible cause for this increased incidence. In Great Britain three main types of asbestos fibre are used - chrysotile, crocidolite and amosite. Crocidolite and amosite are iron-containing types of asbestos imported from South Africa. It is understood they are much less used in North America where the cancer association is less evident. There is also an increased incidence of occupational tumour of the lung in chromate manufacturers (Bidstrup, 1956), while the existence of a causal relationship between pulmonary siderosis and primary lung cancer has been mooted by several investigators (Hueper, 1942). The possibility that in all these groups a common type of carcinogen may be operating and that this substance is an iron compound appears an attractive hypothesis although clearly there are weighty objections to accepting iron itself as the carcinogenic agent.

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