In the past several years, the spectrum has widened considerably. First, it has been recognized that the hazard associated with direct occupational exposure to asbestos is by no means a narrow or infrequent one. The experiences of insulation workers in this country are instructive. These men, employed in the construction industry and often working out-of-doors and with materials containing only limited amounts of asbestos, are much less exposed than many factory workers had been. Yet their health experiences have been disastrous.

We have studied all members of the Insulation Workers Union in the New York metropolitan area. On December 31, 1942 there were 632 members of this Union. Calculations in studies by E. Cuyler Hammond, J. Churg and myself indicated that by December 31, 1962, according to life expectancy in the general population of U.S. white males, there should have been 203 deaths among these men. Instead, there were 255—an excess of twenty percent. Using age, year and sex-specific rates, there should have been six or seven deaths due to cancer of the lung or pleura. Instead, there were 45. There should have been nine or ten deaths due to cancer of the stomach or colon; there were 29. There should, of course, have been no deaths due to asbestosis; there were twelve.

Similar calculations to mid-1967 gave similar results. Whereas 47 deaths were expected, there were 94. Where eight or nine deaths due to cancer were predicted, there were 49. Again, there was a significant excess of specific types of cancer. While there should have been two or three deaths due to cancer of the lung or pleura, there were 27, and there were eight deaths due to gastrointestinal cancer against two expected. Once more, asbestosis claimed fifteen lives against none expected.

Studies are now under way in our laboratory of insulation workers in other parts of the country. Mortality data indicate that the New York findings are unfortunately true elsewhere, as well. It is not known exactly how many asbestos insulation workers are employed in the United States; estimates range from 50,000 to 100,000. In the face of the mortality information, one hopes the lower figure is more accurate.

Information is incomplete concerning the number of workmen in other trades in the United States with direct occupational asbestos exposure. Totals of 100,000 to 125,000 are often proposed. Again, the lower figure is hoped for, especially in view of the absence of satisfactory mortality information concerning such asbestos factory workers, and since Mancuso's findings are disquieting.

Analysis of these mortality experiences is disturbing from another point of view, in addition to its magnitude. I refer to the occurrence of pleural and peritoneal mesothelioma (tumors of the lining of the lung and abdominal cavities) among these workmen with direct occupational exposure. During the 1950's, there were several reports of deaths in asbestos workers caused by these diffuse tumors of the mesothelial surfaces. Such isolated cases would have received little notice had it not been for the fact that the tumor has always been considered extraordinarily rare. It is no longer rare among asbestos workers. Indeed, it is so common a cause of deaths among them now—while still rare among individuals not known to be exposed to asbestos—as to almost constitute a tumor specific to asbestos exposure. Several reviews of autopsy files suggest that this rapid increase, with hundreds of cases now known in Great Britain, South Africa, the United States and Canada, is not due to refinement in diagnosis. Thus, review of all possible cases in several major pathology departments in Scotland has demonstrated an increase from one or two cases a year in the 1950's to some twenty cases a year or more at the present time. Fourteen of the last 120 deaths in New York among asbestos insulation

TABLE 1

Observed and Expected Number of Deaths among 632 Asbestos Workers Exposed to Asbestos Dust Twenty Years or Longer, 1943-1962

Cause of Death		1943-1947	1948-1952	1953-1957	1958-1962	Total 1943-1962
Total cancer, all sites	Observed	13	17	26	39	95
	Expected	5.7	8.1	13.0	9.7	36.5
Cancer of lung and pleura	Observed	6	8	13	18	45
	Expected	0.8	1.4	2.0	2.4	6.6
Cancer of stomach, colon, and rectum	Observed	4	4	7	14	29
	Expected	2.0	2.5	2.6	2.3	9.4
Cancer of all other sites combined	Observed	3	5	6	7	21
	Expected	2.9	4.2	8.4	5.0	20.5
Asbestosis	Observed	0	1	4	7	12
	Expected					less than 1
Total, all causes	Observed	28	54	85	88	255
	Expected	39.7	50.8	58.6	54.4	203.5

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