

growing number of reports of individual cases suggests that these tumors are perhaps becoming relatively frequent complications of asbestos exposure.

Our observations in this series are similarly suggestive. In three of the 255 deaths among the men who had worked for 20 years or more, the examining pathologist considered the death due to diffuse pleural mesothelioma, and in the two cases in which we have been able to review the histological material, the histological appearance was that often so categorized, and asbestos bodies were present. This incidence of more than 1% of deaths from pleural mesothelioma is strikingly high for a tumor which is generally considered to be extremely rare. In one case in our series pathological examination suggested diffuse peritoneal mesothelioma. This single experience is too fragmentary for evaluation.

Gastrointestinal Carcinoma.—Isolated instances of gastrointestinal carcinoma in the presence of asbestosis have been known, but there have been no data to indicate that these were more than coincidental findings. Among the asbestos workers studied here, cancer of the stomach, colon, and rectum was three times as frequent as expected. These data suggest that there may perhaps be an etiological relationship between industrial asbestos exposure and carcinoma of the gastrointestinal tract.

Environmental Asbestos Exposure.—The recent demonstration, by South African⁹ and British¹⁰ investigators of pleural and peritoneal neoplasms among individuals who had chance environmental exposure to asbestos many years before raises the very important question of possible widespread carcinogenic air pollution. The possibility of environmental exposure has long been known. Soon after the initial clarification of asbestosis as a clinic entity, Haddow¹⁰ demonstrated asbestos bodies in a man not employed in the industry but living next

door to an asbestos factory. This finding was later mirrored in the finding of chronic beryllium disease among residents of a community near a beryllium factory.¹¹ What is new, however, is an appreciation of the potential extent of the problem. Thomson and associates¹² have reported the frequent findings of asbestos bodies in the lungs of urban dwellers. Among 6,312 individuals x-rayed in an area about an asbestos mine in Finland, Kiviluoto¹³ found 499 cases of pleural calcification of the type characteristically seen among asbestos workers, without obvious cause. In a comparable area without any asbestos mine, no cases were found among 7,101 persons x-rayed. It should be noted that these were not people who worked in the mine—none did—but, rather, were farmers, housewives, and others who lived in the general location. In one subject who came to autopsy, polarized-light microscopy demonstrated asbestos fibers in the lung. Similarly, the lung of a cow grazing near the mine also showed the presence of asbestos.

A particular variety of environmental exposure may be of even greater concern. Asbestos exposure in industry will not be limited to the particular craft that utilizes the material. The floating fibers do not respect job classifications. Thus, for example, insulation workers undoubtedly share their exposure with their workmates in other trades; intimate contact with asbestos is possible for electricians, plumbers, sheet-metal workers, steamfitters, laborers, carpenters, boiler makers, and foremen; perhaps even the supervising architect should be included.

1 E 100th St, New York 10029 (Dr. Selikoff).

This study was supported by the Health Research Council of the City of New York.

Cooperating in this investigation were the executive officers of the International Association of Heat and Frost Insulators and Asbestos Workers, Washington, DC, and the officers and membership of the New York and Newark, NJ, locals of this Union.

References

1. Lynch, K.M., and Smith, W.A.: Pulmonary Asbestosis: Carcinoma of Lung in Asbesto-Silicosis, *Amer J Cancer* 24:56-64 (May) 1935.
2. Annual Report of Chief Inspector of Factories for Year 1955, London: Her Majesty's Stationery Office, 1956, cmd 8, p 206.
3. Doll, R.: Mortality From Lung Cancer in Asbestos Workers, *Brit J Industr Med* 12:81-86, 1955.
4. Bohlig, H., and Jacob, G.: Neue Gesichtspunkte über den Lungenkrebs der Asbestarbeiter, *Deutsch Med Wschr* 81:231-233 (Feb 17) 1956.
5. Braun, D.C., and Truan, T.D.: Epidemiological Study of Lung Cancer in Asbestos Miners, *AMA Arch Industr Health* 17:634-653 (June) 1958.
6. Wagner, J.C.; Sleggs, C.A.; and Marchand, P.: Diffuse Pleural Mesothelioma and Asbestos Exposure in North Western Cape Province, *Brit J Industr Med* 17:260-271, 1960.
7. Hammond, E.C., and Garfinkel, L.: Smoking Habits of Men and Women, *J Nat Cancer Inst* 27:419-442 (Aug) 1961.
8. Hammond, E.C., and Horn, D.: Smoking and Death Rates: Report on Forty-Four Months of Follow-up of 187,783 Men. I. Total Mortality; II. Death Rates by Cause, *JAMA* 166:1159-1172 (March 8); 1294-1308 (March 15) 1958.
9. McCaughey, W.T.E.; Wade, O.L.; and Elmes, P.C.: Exposure to Asbestos Dust and Diffuse Pleural Mesotheliomas, *Brit Med J* 2:1397 (Nov 24) 1962.
10. Haddow, A.C., in Report of Annual Meeting of British Medical Association, Manchester, 1929, *Lancet* 2:230-231 (Aug 3) 1929.
11. Chesner, C.: Chronic Pulmonary Granulomatosis in Residents of Community Near Beryllium Plant: Three Autopsied Cases, *Ann Intern Med* 32:1028-1048 (June) 1950.
12. Thomson, J.G.; Kaschula, R.O.C.; and MacDonald, R.R.: Asbestos as Modern Urban Hazard, *S Afr Med J* 37:77-81 (Jan 19) 1963.
13. Kiviluoto, R.: Pleural Calcification as Roentgenologic Sign of Non-Occupational Endemic Anthophyllite-Asbestosis, *Acta Radiol Suppl* 194, pp 1-67, 1960.