

# CANCER FOLLOWING OCCUPATIONAL EXPOSURE TO ASBESTOS AND VINYL CHLORIDE

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A review is presented of the various factors important in the identification of carcinogenic disease from occupational and environmental exposure to asbestos and vinyl chloride. The long lapsed period, usually of 20 or more years from first exposure to these materials, is discussed, as well as the requirement for sufficiently long observation periods in prospective epidemiological studies. The multiple-factor etiology of lung cancer involving cigarette smoking and asbestos exposure is illustrated. The risks of asbestos-related cancers to other than those directly working with the material are discussed in a variety of circumstances, and finally the effectiveness of control procedures for vinyl chloride and asbestos are compared.

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NINETEEN SEVENTY-FIVE WAS THE 200TH ANNIVERSARY of the publication by Percivall Pott of his observations of scrotal cancer among chimney sweeps in Great Britain.<sup>1</sup> This pioneering paper on occupational cancer by an alert surgeon recognized one of the salient features of occupational carcinogenesis, the lapsed period between time from first exposure and the manifestation of symptoms. The chimney sweeps were employed as young children, but the cancers did not appear until after puberty, when they were usually considered venereal in origin and treated accordingly. This aspect of occupationally induced cancer continues to bedevil us 200 years later, as we try to identify sources of disease among working populations. Since the serious effects of exposure to carcinogens do not become clinically manifest for years, often decades, a causal association is not often easily identified between agent and disease.

Approximately 100 materials used or appearing in industrial processes have been identified as carcinogens.<sup>2</sup> Fortunately, most have limited use and few workers are exposed, but some are used extensively. In this latter category are asbestos and vinyl chloride. A review of the health

effects of these two materials is instructive as they offer similar, but in some respects contrasting, examples of the current difficulties of identifying and controlling carcinogenic materials in the workplace.

## Asbestos Health Effects

The modern history of asbestos disease dates from the turn of the century, when two reports were published documenting uncontrolled conditions in asbestos textile factories. One, the testimony of Dr. H. Montague Murray at a compensation hearing, described severe pulmonary fibrosis found at autopsy, in 1900, in the last survivor of a group of ten workers first employed 14 years previously in a carding room.<sup>3</sup> At the time of the hearing, in 1906, Dr. Murray offered the optimistic prognosis, "One hears, generally speaking, that considerable trouble is now taken to prevent the inhalation of dust, and so the disease is not so likely to occur as heretofore."<sup>4</sup> The second was the description by Auribault of deaths during the early years of operation of an asbestos weaving mill established at Conde-sur-Noireau, France, in 1890.<sup>5</sup> During this period, 50 men died, including 16 of 17 recruited from a cotton textile mill previously owned by the factory director.

Subsequently, cases of pulmonary fibrosis following inhalation of asbestos were published in the medical literature, including one by Cooke, who gave the disease its current name, asbestosis.<sup>6</sup> A 1929 study of asbestos textile operations by the British Factory Inspectorate revealed the existence and extent of a continuing problem.<sup>7</sup> In a clinical survey of mill employees, 80% of those employed for 20 years or more had

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x-ray evidence of asbestosis. The factor stimulating the introduction of control technology in the establishment of an ongoing program. Again an optimistic outlook is apparent in a great measure, or thereabout, application of preventive measures in a great measure.

In time, however, associated with asbestos exposure. In 1935 an expanded study was published of lung cancer in men who had died of asbestosis.<sup>8,9</sup> While sufficient to causally relate lung cancer, the position was confirmed by showing that 13% of asbestosis in Great Britain was due to the lining of the ship, frequently to have exposure in 1960.<sup>10</sup> such exposure in 1960 also was found to insulation workers.

In 1975, three first identification society continues, unfortunately, the general asbestos-related those directly working near asbestos material simply live in the atmosphere or in the home.

## High Exposure

The full spectrum of exposure is best illustrated by Hammond and colleagues' experience of 17,800 workers.<sup>11</sup> Table 1 shows the results among this group in 1967, through 1970, individuals who were due to lung cancer, and (a tumor so rare) may account for the absence

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