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SATURDAY, NOVEMBER 25, 1944

## ENVIRONMENTAL CANCER

Environmental cancer is cancer due to prolonged contact with some cancerigenic agent in the environment. The relationship of a previous exposure to such an agent and the cancer often appearing many years later is frequently overlooked or not understood. Environmental cancers can be divided into four main groups according to the type of exposure:

First are the cancers caused by agents in the normal environment. Representative of this group is cancer due to the continued ingestion of arsenic in drinking water and foodstuffs in certain regions, the solar cancers of the skin in dry and sunny regions, as in our Midwestern and Southwestern states, the bladder cancers in people in places like Egypt with endemic schistosomiasis, and possibly also lung cancers due to inhalation of road dust containing cancerigenic tar. The second group of environmental cancer results from certain habits (habitual cancer), as for example cancer of the lip and mouth in smokers, cancer of the oral lining in betel and tobacco chewers, and cancer of the abdominal skin in kangri users. The third group comprises cancer resulting from use of certain medicinal agents (medicinal cancers), e. g. cancer of the skin after arsenical medication and after exposure to roentgen rays and radioactive substances. The fourth, which is the largest and most important group, is represented by occupational cancer elicited by exposure to chemical and physical agents in the course of regular occupations.<sup>1</sup>

The agents known or suspected to cause occupational cancer are arsenic, chromates, nickel carbonyl, radium, mesothorium, asbestos, crude and processed mineral oils,

1. Clemensen, J.: *Cancer and Occupation in Denmark, 1935-1939*, Copenhagen, Nyt Nordisk Forlag-Arnold Busck, 1941. Davis, E.: *Chemical Carcinogenesis, Drugs, Dyes, Remedies and Cosmetics with Particular Reference to Bladder Tumors*, J. Urol. **49**:14, 1943. Gross, E.: *Das Carcinom vom Standpunkt des Gewerbetoxikologen*, Ztschr. f. angew. Chem. **53**:368, 1940. Hueper, W. C.: *Occupational Tumors and Allied Diseases*, Springfield, Ill., Charles C Thomas, 1942, p. 896; *Cancer in Its Relation to Occupation and Environment*, Bull. Am. Soc. Control of Cancer **25**:6, 1943. Warren, S.: *Minimal Criteria Required to Prove Causation of Traumatic or Occupational Neoplasms*, Ann. Surg. **117**:585, 1943.

pitch, tar, soot, paraffin oil, anthracene oil, creosote, aromatic amino compounds (aniline, naphthylamine, benzidine), benzene, ultraviolet rays, roentgen rays, radioactive materials and substances from certain parasitic worms. Approximately 8,000 to 9,000 cases of occupational cancer appear to have been placed on record, the majority during the last two to three decades, during which the sources of occupational cancer were mostly discovered. These figures, however, do not reflect the actual incidence of industrial cancer, as the cause of many cases of this type is not properly recognized or their occurrence is not recorded.

Environmental cancer may involve many organs and tissues, notably the skin, lip, tongue, cheek, oral cavity, nasal sinuses, larynx, bronchi, lung, liver, kidney, ureter, bladder, connective tissue, bone and hemopoietic tissues. The site of the cancer depends on the type of the cancerigenic agent and the kind of exposure. The sex ratio is determined mainly by the exposure to the various cancerigenic agents. It is for this reason that the male sex is predominantly affected by occupational cancer, but osteogenic sarcoma occurs in women working in luminous dial factories. Undoubtedly the rapid increase in the employment of women in hazardous industries will be followed by an increase of occupational cancer in women.

The public health importance of industrial cancer undoubtedly will increase not only with respect to the number of workers, male and female, exposed to industrial cancerigenic agents but also with respect to the variety of plants and operations in question. Public health authorities will wish to institute effective technical and sanitary supervision of such establishments as well as medical control of the workers, present as well as past. Practitioners and cancer clinics, in addition to industrial physicians, will aid greatly in meeting this situation by close study of the occupational history of all patients coming to them with precancerous and cancerous lesions. It is mainly in this way that the industrial origin of cancer can be established and new sources of occupational forms discovered. The benefits from such efforts will be not only the early detection and improved prognosis of cases of occupational cancer but also the prevention of industrial cancer by the elimination of exposures to cancerigenic agents. Industrial cancer is largely preventable by proper technical measures.

Organized investigation of environmental and especially occupational cancers is a promising approach to the study of fundamental problems of human cancer because these cancers are the counterpart of experimental cancer in animals. Environmental cancers permit a scientific analysis of cancerigenic agents and of local and general reactions induced by them in human beings.