

incidence of cancer in a number of the other organs" (Cramer, 1936).⁶ A constant watch must be kept on "amounts" of cancer if proportions are being altered by industrial forms of the disease.

OCCUPATIONAL CANCER IN THE DYESTUFFS INDUSTRY

Why should 1 in 10 or even more of men engaged in the manufacture and usage of certain dye intermediates (aromatic amines) develop tumors of the bladder? These workers are exposed by inhalation, ingestion and absorption of these compounds through the skin and yet the tumors are located in the bladder. This striking observation has fired the imagination of many workers and we think we are justified in stating that we are beginning to understand the reasons. The knowledge thus gained has altered our conception of the range and mode of action of chemical carcinogens in an interesting way.

An extremely good survey of tumors of the urinary bladder in workmen engaged in the manufacture and use of certain dyestuff intermediates in the British chemical industry has recently been published by Case and his associates⁷ (Table 2). They have shown that although there is a small spontaneous incidence of bladder tumors in the general population ($2\frac{1}{2}$ times greater in males than in females and rare under 55 years of age) the risk is 30 times greater in chemical workers and the age of onset is on an average 15 years earlier. Manufacturers, users and purifiers are affected in descending order of severity, the noxious substances being 2-naphthylamine, benzidine and possibly auramine and magenta. There is no evidence that aniline is incriminated. As the induction period is constant at 15 to 20 years, the age at onset of the disease is dependent upon the age at entry of a man into the industry. This is linked with the fact that it is the length and not the severity of exposure that matters, individual susceptibility being a marked feature. There is no special tendency for industrial tumors to be

TABLE 2
OCCURRENCE OF BLADDER TUMORS IN MANUFACTURERS AND USERS OF DYESTUFF
INTERMEDIATES (CASE ET AL.⁷)
Population at Risk = 4622 Men

Expected deaths in comparable general population	3-5
Actual deaths in industry	127
Actual cases in industry	282
Risk in industry	30 times that of general population
Chemical exposure	Benzidine Beta-naphthylamine Alpha-naphthylamine
Age of onset	15 years earlier than in general population
Induction period	15-20 years
Degree of malignancy	Comparable to tumors of bladder in general population
Survival after diagnosis	20 per cent survived 10 years
Exposure	Length, not severity, affects induction time
Individual susceptibility	A marked feature of unknown cause

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