PROCEEDINGS OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE **183**, 279–280 (1986)

Nutrition and Cancer: Introduction[1] (42419)

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The interest in nutrition and cancer is not new. In 1809 William Lambe (1) published a treatise on diet and cancer in which he impugned foods of animal origin and ordinary water as the principal causes of cancer. Lambe's prescription for cancer prevention was a strict vegetarian diet and distilled water. There was an interest in undernutrition as a preventative measure in experimental carcinogenesis at the beginning of this century (2, 3). Major research activity relating to diet and cancer was evident in the 1940s with the work being centered in the laboratories of Tannenbaum at the Michael Reese Hospital in Chicago and of Baumann who was at the University of Wisconsin. A survey of index entries under "diet" found in Cancer Research, Volumes 1 (1941) to 43 (1983) shows 52 listings between 1941 and 1950, 49 between 1951 and 1960, 18 between 1961 and 1965, 13 between 1966 and 1975, and 70 between 1976 and 1983. Clearly interest is on the upswing.

Diet can influence carcinogenesis in a number of ways. There is the possibility of direct ingestion of carcinogens or their precursors; diet can affect the ways in which carcinogens are transported or metabolized; diet can provide substrates for carcinogen formation; diet can affect cellular metabolism so as to increase receptivity for carcinogenic action. Finally, the bulk of diet (calories, energy) may enhance carcinogenesis.

Mortality from cancer as a function of body weight (4) has shown that cancers of the endometrium, gallbladder, cervix, colon, and pancreas may be more prevalent in subjects who are to 10–20% overweight but a few cancers, among them lung and lymphoma, are elevated in subjects who are 11–20% underweight. Overall, underweight appears to be more of a risk in men than in women. A study of diet and its relation to colon cancer was reported over 50 years ago (5). That study indicated vegetables, cereals, and dairy products as negative risk factors.

There have been a number of reviews of diet and cancer (6–12) which have discussed the waxing and waning of cancers in different countries (i.e., stomach cancer in the U.S.) as function of environment and life-style. Doll and Peto (13) summarized changes in percentage of mortality from stomach and lung cancers in 15 countries between 1950 and 1976. The average reduction in stomach cancer mortality was 61% while the average increase in lung cancer mortality was 106% (the largest change, in Japan, being +408%).

In view of the general acceptance that cancer is a disease of multiple etiology, Armstrong and Doll (7) (in reviewing diet and cancer) cautioned, ". . . it is clear that these and other correlations should be taken only as suggestions for further research and not as evidence of causation or as bases for preventive action." This admonition has gone unheeded in recent years.

In 1981, Doll and Peto (13) published an exhaustive review of cancer risks in the United States. They suggested that 30–70% of cancers might be related to diet but also stated, "It must be emphasized that the figure chosen is highly speculative and chiefly refers to dietary factors which are not yet reliably identified." Doll and Peto's estimate of diet-related cancer cause has too often been interpreted as established fact rather than estimate. In discussing the early experiments on caloric restriction they made the prescient observation, ". . . more interest might have been aroused, however, if the freely fed mice had been described as obese instead of the mice on the restricted diet being described as small!"

In 1982 a committee of the National Research Council reviewed data on diet and cancer (14) and found data for most nutrients to be incomplete with regard to establishment of cause. However, the committee did issue interim dietary suggestions which included reduction in fat intake and the importance of

[1] Presented at The Society for Experimental Biology and Medicine Symposium on Cancer and Nutrition, St. Louis, Missouri, April 15, 1986, FASEB Meeting.

0037-9727/86 $1.50

including fruits, vegetables, and sources of fiber in the daily diet. The committee concluded that there were insufficient data regarding proteins, carbohydrates, and an array of minerals (selenium, iron, zinc, copper, molyblenum, arsenic, cadmium, lead).

More work is required to bring the role of diet in cancer into better focus—more detailed analysis of foods, data on possible interactions of nutrients, more sharply focused animal studies, increased epidemiological surveillance, uniformity of epidemiological and experimental protocols and clinical tests of theory. All of these are in progress and a more accurate picture is certain to emerge. Until then, experimental and clinical data must be carefully and fairly assessed bearing in mind T. H. Huxley's aphorism: "The tragedy of science—the slaying of a beautiful hypothesis by an ugly fact."

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