OPINIONS

Medicine as an art demands constant evaluation, weighing new treatments against old practices, benefits against risks, successes against failures. On occasion, the evidence leads to different conclusions. Nowhere is this more evident than in the management of the cancer patient.

OPINIONS will present the views of specialists on a wide spectrum of controversial subjects. It is hoped that the frank expression of ideas will provide a framework within which our readers may form their own opinions.

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WARNING: FALSE CANCER CLAIMS MAY BE HAZARDOUS TO YOUR HEALTH

In the fall of 1974, a rash of newspaper and magazine headlines claimed that contaminants discovered in the lower Mississippi Valley drinking water were associated with a grave risk of cancer. One accompanying illustration, playing upon the story's shock-value, showed the face of a man drinking a glass of water, and was captioned: "Will he get cancer?"

It is highly unlikely that the trace contaminants of drinking water would pose specific risks of cancer in the general population. Yet these unfounded claims, sensationalized in the media, have greatly alarmed the public. We can say that environmental factors cause about 80 percent of all human cancers, and this knowledge is grounded in both epidemiologic and experimental data. The major human cancers are due to our lifestyle, among which cigarette smoking and diet, especially high-fat, low-fiber foods and mode of cooking, are key elements.

When the public is informed of newly found environmental cancer hazards, it is imperative that the information be supported by definitive documentation. Scare tactics are counter-productive. If baseless assertions continue, society will only become deafened to *bona fide* evidence of real carcinogenic hazards. Valuable research funds and time will be diverted in useless investigations, and efforts to focus on the key causes and prevention of major human cancers will be neglected for lack of resources.

The stories dealing with the "carcinogenic" contaminants in the Mississippi River were spun before any scientific evidence had even established what that drinking or river water contained. Scientists in the fields of chemical carcinogenesis and cancer etiology were left wondering as to the nature and basis of the problem. Months after the announcements had alarmed the general public, a paper appeared in *Science,* but it merely listed the chemicals found in the water of that region; its tables gave no information concerning the amounts of those chemicals. The carcinogenicity of the agents was implied, but not specifically discussed in relation to the publicly announced cancer hazard. Buried in the text was a statement that the salient contaminant was chloroform, and that it was present at the level of three parts per million. Chloroform had been shown to induce liver tumors in mice in about 1945. While I was at the National Cancer Institute, additional tests on this and other chlorinated hydrocarbons had been started under my direction; however, detailed and carefully evaluated results of these tests were not available at the time of the publicity.

Most chemical carcinogens have one or more specific target organs. No agent is known which leads to a generalized increase in diverse tissues. Yet, the implication of the publicity about contaminants in water was that these contaminants served to increase the cancer risk at diverse sites for people using such water. This is scientifically unsound extrapolation. Aflatoxin, for example, causes cancer mainly in the liver in many experimental species and is strongly suspected of doing so in man. Aromatic amines in an occupational setting have led to cancer in the urinary bladder in man and in most experimental species in which these same chemicals were tested, although in mice they also led to tumors of the liver. The fact that this is so probably stems from the specific biochemical transformation required to convert procarcinogens to the ultimate active forms. The required enzymes are probably similarly located in organs across species lines, although admittedly, more research in this area is necessary. Nonetheless, if chloroform and other such chlorinated hydrocarbons did cause cancer in man, the preferred site would be the liver or kidney. These are among the rare cancers of man in the United States.

Not all carcinogens are alike. The mold toxin and aflatoxin B_1 causes liver cancer in rats even at one part per *billion* in the diet; the flavoring agent safrole requires 2000 to 5000 parts per *million*, a considerable difference! Yet the FDA has banned safrole, but has set a tolerance of 15 parts per billion for aflatoxin B_1. The latter is a sound practical decision, for setting a "zero tolerance," for foods with aflatoxin B_1 would require a ban on many of our foods! Thus, the FDA also tacitly underwrites the existence of "no effect" levels even for powerful carcinogens.

The other question is whether chemicals which are carcinogenic in experimental animals at high dose levels can actually lead to cancer in man in trace amounts even when present for an entire life span. All known chemical carcinogens have a classical pharmacological dose response. The higher the dose, the higher the cancer yield and the shorter the latent period, and vice versa. To be sure, there are synergistic effects like inhalation of asbestos and smoking of cigarettes where the asbestos enhances manyfold the risk due to smoking alone. Nevertheless, it is most unlikely that the trace contaminants of drinking water or river water would be associated with specific carcinogenicity in the general population. In this instance, the press reports thoroughly frightened the public. This does not mean we should not clean up our rivers and water. This is an urgent aim, meritorious for its own sake. But we should not have to use a cancer scare to reach this goal.

Misguided concern about the relationship of certain food additives to cancer is yet another case where facts were grossly misrepresented and funds needlessly spent. When a study performed abroad found that the food dye Red #2 had a "carcinogenic effect," well-meaning but ill-informed lay groups exerted pressure on the United States Food and Drug Administration (FDA) to re-examine the data in their hands. The foreign investigation claimed to have obtained evidence for carcinogenicity in a test where the treated animals developed cancer in different target sites, mostly in the endocrine-sensitive organs such as pituitary, gonads and uterus. In a lifetime study, the control animals reportedly had no cancer. This is a most unusual finding: the cancers seen in the experimentally treated group were the ones normally present in aged untreated controls. Yet these were the results which apparently caused the FDA to set up another expensive research project to re-test this dye, even though in the mid-1950's, FDA scientists of excellent standing and repute had conducted a test series involving large numbers of mice and rats, and had concluded that this dye presented no

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