CANCER RESEARCH

VOLUME 17  JANUARY 1957  NUMBER 1

Carcinogenesis by Radiation

GUEST EDITORIAL

The carcinogenic effect of sunlight, of x-rays, and of radium have long been known. The demonstration by Rusch and others that specific wave lengths of ultraviolet light will induce cancer and the carcinogenicity of beta, gamma, and x-rays indicate that exposure of cells to waves from specific portions of the electromagnetic spectrum are among the causes of neoplasia. Alpha particles and neutrons are also capable of inducing tumors. In certain instances, at least, there is a fairly close relationship between the quantity of ionizing radiation and the frequency of appearance of tumors in the irradiated population, and this affords a further refinement. Thus, we have a potent but somewhat neglected tool by which to advance our knowledge of the carcinogenic process. This is a method by which the addition of energy alone, without chemicals or viruses, will cause cancer.

The increase in leukemia found by the Atomic Bomb Casualty Commission in Japan in survivors at Hiroshima and Nagasaki, the British study of the occurrence of leukemia in patients with ankylosing spondylitis treated by x-radiation, and the relatively high incidence of leukemia in radiologists all indicate that ionizing radiation can induce leukemia in man.

The time required for development of cancer in man may be a relatively few years. In the case of leukemia, the average length of time between the first exposure to x-rays and the diagnosis of leukemia was about 6 years in the British experience; some cases appeared in less than 4 years among the Japanese. In contrast with this, tumors following x-ray therapy usually have a much longer period from first exposure to diagnosis, about 20 years or more. The average period of occupational exposure in the Schneeberg miners developing lung cancer was about 17 years. Of particular interest is the finding by Hempelmann and others that irradiation of the thymic gland in infancy leads to an increased incidence of cancer of the thyroid 20 or more years later. Anatomic localization of radioactivity is important. The beta radiation of strontium has been shown to produce bone tumors in animals and may be capable of so doing in man. Ingested radium has caused osteogenic sarcoma in man.

Most of the cancers induced by irradiation are not specifically related to the type of radiation, although leukemia appears to be the neoplasm most clearly associated with total-body radiation and carcinoma of the skin most frequent following localized x-radiation. Interestingly enough, thorotrast tends to induce hemangioendothelioma, and there is a great preponderance of carcinoma over sarcoma following irradiation of the skin.

Furth has demonstrated also the indirect induction of tumors through radiation damage to different parts of the endocrine system. Thus, the destruction of the thyroid in mice by radioactive iodine leads to pituitary tumors through the continued stimulation of thyrotropes. Another example is the production of ovarian tumors by irradiation through the depressant effect on the irradiated ovaries and the resultant continuing stimulation of the remaining ovarian tissue by gonadotropes. Furth and Tullis have pointed out that ionizing radiation may also have carcinogenic action.

Now that man has entered upon the atomic age and has a greater potential exposure to radiation than before, intensive work is indicated in the field of radiation carcinogenesis. However, as has been shown by the report on the biological effects of radiation by the National Academy of Sciences, man can learn to live safely through adequate control of sources of ionizing radiation.

SHIELDS WARREN
Cancer Research Institute
New England Deaconess Hospital
Boston 15, Massachusetts
Carcinogenesis by Radiation: Guest Editorial

Shields Warren

*Cancer Res* 1957;17:1.

Updated version  Access the most recent version of this article at:
http://cancerres.aacrjournals.org/content/17/1/1.citation

E-mail alerts  Sign up to receive free email-alerts related to this article or journal.

Reprints and Subscriptions  To order reprints of this article or to subscribe to the journal, contact the AACR Publications Department at pubs@aacr.org.

Permissions  To request permission to re-use all or part of this article, contact the AACR Publications Department at permissions@aacr.org.