85

710028

12:1365 THERAPEUTIC APPLICATION OF HIGH ENERGY SOURCES; POTENTIATION OF RADIATION EFFECTS WITH

MODIFIERS. Griem, M. L. (Argonne Cancer Research Hospital, Chicago, Ill.). Contract AT(11-1)69.

This clinically-oriented program is designed to compare the relative efficiency of supervoltage radiations (x-ray, cobalt-60 gamma rays, electrons and fast neutrons) in the treatment of cancer; and to explore the use of drugs as agents to increase the lethal effects of radiation on tumors. Hodgkin's disease and other lymphomas are being treated by a combination of laparotomy to improve staging and diagnosis, and carefully planned radiation to indicated organs of involvement. A number of malignancies are being treated with ultrahigh dose rate electrons to study the effects of this radiation. Chromium-51 radioactive permanent implants are also being evaluated. Head and neck malignancies are being subjected to combined treatment schedules, including drug pre-treatment and split-course radiation. The sensitizing qualities of hydroxyurea and cytosine arabinoside are being tested on a hair follicle indicating system before being tested on animal tumors and patients.

The aggressive radiation treatments outlined above seem to have been satisfactory in promoting regression of tumors and prolonging survival. Studies on the effects of high dose rate electrons on Chinese hamster cells irradiated in tissue culture indicate that the radioprotective effort observed at these high levels of irradiation is due to a destruction of free radicals. Hydroxyurea has been shown to increase the radiosensitivity of hair follicle cells of mice if injected 8 hours before the animals are irradiated.

1067013

DOE/HQ

1968

_/:1614 THERAPEUTIC APPLICATION OF HIGH ENERGY SOURCES. Griem, M. L. (Argonne Cancer Research Hospital, Chicago, Ill.). Contract AT(11-1)-69.

This project is concerned with a comparison of the clinical and radiobiological effects of high energy electrons, supervoltage radiation and orthovoltage radiation. It also evaluates the effectiveness of high energy radiation therapy in the control of malignancies, and unusual methods of treatment, including high energy electrons and fast neutrons. On-going clinical studies deal with: the relative values of pre- and postoperative radiation in malignancies of the ear, nose, and throat; the relative values of supervoltage radiation and high energy electrons in treatment of carcinoma of the cervix; treatment of mycosis fungoides with high energy electrons; the use of interstitial chromium-51 wire in treatment of advanced malignancies; the National Studies on Lung cancer; carcinoma of the oesophagus; certain lymphomas; the use of methotrexate and irradiation for treatment of head and neck tumors.

Studies in the laboratory use both cell culture methods and in vivo techniques. Cells of onion root tips are being used to measure relative biological effects of radiation in an international study of the mitotic index of cells.

The project continues to amass information on the value of the high energy machines in the control of malignancies. Selected patients, some large mammals (including a strain of miniature pigs), some rodents, and a mammalian skin culture line and onion seedlings all have given evidence of tissue tolerance to the effects of high energy electrons. Highly purified chromium-51 wire has proved effective in the treatment of certain deep-seated malignancies, including tumors in the pelvis, and chest.

1067014

DOE/HQ

11:1615 POTENTIATION OF RADIATION EFFECT WITH MODIFIERS; AND EVALUATION OF RBE OF HIGH ENERGY RADIATION THERAPY MACHINES. Griem, M. L. (Argonne Cancer Research Hospital, Chicago, Ill.). Contract AT(11-1)-69.

1968

This project is designed to extend the range of malignancies that can be effectively treated, by the use of drugs that enhance the radiation effect.

Preliminary screening of these drugs is carried out by observing their effect in conjunction with radiation on such tissues as the mammalian hair follicle; animal tumors; and a mammalian cell culture line. Such laboratory work is followed by clinical trials on selected patients. At present, clinical tests are being carried out on colchicine and actinomycin.

The specific damage that high energy radiations produce in dividing cells is being studied by evaluating the surviving fractions of hair after treatment with single and multiple doses of X ray and drugs, and the uptake of radioisotopes, such as labeled selenium and zinc by the cells of the growing or resting hair.

Approximately 100 patients have now been treated with actinomycin and radiation, the most success being achieved with the sarcomas and related tumors, which are primarily radioresistant. Over 200 patients have been treated with colchicine and radiation, which treatment seems to be most effective for tumors of the intestinal tract.

1067015

DOE/HQ