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Title: Total Body Radiation and Bone Marrow Transplantation in Cancer Treatment.

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I. PURPOSE:

High dose curative radiotherapy is not feasible in treatment of widely metastatic carcinoma. Most solid tumors are poorly responsive to chemotherapy. In this Center a study has been conducted for almost nine years on the effect of whole body radiation on patients bearing metastatic carcinoma. The doses of radiation employed have generally ranged from 100 to 250 rads to the whole body or 300 rads to one half of the body. The mammalian cell dose is 100 to 180 rads for all mammalian cells studied to date (1). This is the dose necessary to reduce the cell population to 37 percent of the initial valve. At these dose levels we have reported prolongation of human life (2).

The pathophysiological effects of whole body radiation on humans have been ascertained only through retrospective studies of surviving residents of Hiroshima and Nagasaki after the atomic bombings of 1945 and in a few unfortunate victims of nuclear reactor accidents. In both of these groups the actual dosimetry of radiation exposure can not be determined because of difficulty of determining what percent of a person's body was exposed to the radiation and thus what the whole body dose was (3). Many biochemical and pathophysiological measurements of the effect of whole body irradiation have been made in animals (4), but extrapolation of these results to man has not always been possible (5), and the accuracies of the extrapolations are not clear. Bone marrow depression is a serious hazard in high radiation exposure. In attempts to enhance the safety of patients receiving radiation dose in excess of 150 rads we have been employing bone marrow isotransplantation or autotransplantation.

II. METHODS:

Patients studied have been mainly those with metastatic carcinoma from the colon. Five hundred ml of marrow are obtained either from the patient or a twin (with tissue matching) and stored at 4°C. The marrow is infused over 60 to 120 mins a half hour after radiation. Monitoring after radiation includes measurements of salivary amylose, serum and urine deoxycytidine, lymphocyte response to phytohemagglutinins, and chromosome abberation. White blood cell and platelet counts are made daily for 6 weeks.

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METHODS CONTINUED:

In 8 patients receiving whole body radiation (200 rads) without bone marrow transplant the average radin of white cell count was 900/min^3. Seven patients were similarly irradiated but received also marrow transplants. The mean WBC radin was 3100/min^3 with range of 2200 to 4400.

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