

METASTASIZATION OF GUEREN'S CARCINOMA AFTER COMBINED IRRADIATION AND ADMINISTRATION OF β -MERCAPTOETHYLAMINE

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The treatment of malignant tumors by ionizing radiation is accompanied by radiation injury to the body, which in some cases may intensify the spread of metastases to other organs. In this connection it is interesting to study the metastasization of Gueren's carcinoma after irradiation of the pelvis for a primary tumor of the testis when the organism is protected against radiation injury by administration of β -mercaptoethylamine.

EXPERIMENTAL METHOD

The investigation was conducted on 60 male albino rats weight in 150-200 g. The rats were divided into 4 groups, each of 15 animals. A Gueren's carcinoma was inoculated into the right testis (as 0.2 ml of a 20% suspension of tumor cells in physiological saline).

The pelvic region of the rats of groups 1 and 2 was irradiated on the twelfth day after inoculation with a total absorbed tumor dose of 5220 rad (a sessional dose of 522 rad daily). The RUM-3 x-ray apparatus was used in the conditions of deep x-ray therapy. The body surface of the rats, except the pelvis, was carefully screened.

During the course of x-ray therapy, on two occasions (before the first and sixth sessions), β -mercaptoethylamine was injected intraperitoneally in a dose of 100 mg/kg 5-10 min before irradiation. The rats of the third group were not irradiated but received 2 injections of β -mercaptoethylamine in the same dose and at the same times as the animals of the first group. β -Mercaptoethylamine was injected into the animals in the form of a 2% solution of the hydrochloride, prepared before each irradiation.

The animals of the fourth group received no treatment and acted as controls.

EXPERIMENTAL RESULTS

Some of the animals of every group died from the development of metastases at different intervals after inoculation of the tumor; those which survived were sacrificed on the forty-fifth day after inoculation. Of the group 1 rats, 9 survived until the forty-fifth day after inoculation, of group 2—4 survived, of group 3—8, and of group 4—5 survived.

At autopsy of the dying and sacrificed rats tumor metastases were found in 8 of the 15 rats in group 1 and in 12 of the 15 rats in group 2; in the remaining 7 rats of group 1 and 3 rats of group 2, growth of the tumor could not be observed either at the site of inoculation or in distant organs. It must be emphasized that the tumor in these rats had absorbed following the irradiation. A tumor at the site of inoculation was found in 1 of the 15 rats of group 1 and in 3 of the 15 rats of group 2, in animals which died during or immediately after the end of x-ray therapy.

All the animals of groups 3 and 4 (control) showed the presence of a tumor. In 10 of the 15 rats of group 3 and in 9 of group 4 a tumor was found both at the site of inoculation and in distant organs; in the remaining 5 rats of group 3 and 6 rats of group 4 only the right testis was involved, the site of the original inoculation of the tumor suspension.

In 8 rats of group 1 in which tumor metastases were present, metastases were found in 21 organs, in the 12 rats of group 2—in 37 organs, in the 10 rats of group 3—in 47, and in the 9 rats of group 4—in 44 organs. It should be noted that intensive and very intensive degrees of metastasization were less marked in the animals of groups 1 and 2 (irradiated) than in the other two groups (unirradiated). The mean number of affected organs per rat was 2.6 in group 1, 2.83 in group 2, 4.7 in group 3, and 4.9 in group 4. The results of statistical analysis of the figures showed that the decrease in the intensity of metastasization of Gueren's carcinoma in the animals of groups 1 and 2 by comparison with the control group is significant. No difference was observed between the degree of metastasization of the tumor in the animals of groups 3 and 4.

Hence, absorption of the tumor, and also the smallest number of organs affected by metastases of Gueren's carcinoma, were observed in the animals of groups 1 and 2 (irradiated). The tumor in the group 1 animals was absorbed in many more of the animals, and the viscera were less affected by metastasization, than in the animals irradiated without the radioprotective preparation.

The decrease in the intensity of metastasization in the animals treated by pelvic irradiation only may be attributed to the fact that most tumor cells were injured by the x-rays before they had penetrated into the various organs, and their ability to take hold and form metastases was thus depressed.

The considerable absorption of the tumor in the animals and the lower incidence of metastasization in group 1 may be explained, firstly, by injury to the tumor cells by x-rays in the primary focus, and secondly, by the reduction in the severity of the radiation injury to the body as a result of administration of β -mercaptoethylamine hydrochloride solution. Being less severely affected by radiation injury, the body is thus more easily able to suppress tumor development by its own efforts.

SUMMARY

The paper deals with peculiarities of metastasization of Gueren's carcinoma following irradiation of the pelvis for the primary tumor focus in the testicle, with protection against radiation having β -mercaptoethylamine.

The results of investigations demonstrated that irradiation of the pelvis with the use of β -mercaptoethylamine as well as without it, for a primary focus in the testicle depressed tumor growth and decreased metastasization. In a number of cases complete resolution of the tumor occurred in the sphere of x-ray action. However, the metastatic process was less pronounced in rats receiving β -mercaptoethylamine with subsequent irradiation of the pelvis as compared to the cases in which only irradiation was applied without using the radioprotective preparation.