

THE INFLUENCE OF IRRADIATION ON GALLIUM-67 ACCUMULATION IN ORAL TUMOR

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In general, the accumulation of ^{67}Ga -citrate into tumors diminish after radiation therapy and chemotherapy. For several years, we have been applying the ^{67}Ga scans in order to diagnosis of malignant tumors in oral region. And we noticed that following treatment all the ^{67}Ga scintigrams showed reduced accumulation, and most became negative or only equivocally positive. Then, scanning with ^{67}Ga was performed in the patients with cancer of the upper jaw before and after treatment and changes in the positive images were studied. In addition, tumor tissues were surgically excised from these patients with cancer of the upper jaw after radiation therapy and accumulation of ^{67}Ga into the tissues was examined, the following results being obtained. (1) Before treatment all the ^{67}Ga scanning images of the patients with cancer of the upper jaw were positive. However, after treatment, ^{67}Ga scanning images had changed into negative or slightly positive. (2) Accumulation of ^{67}Ga into the tumor tissue was almost proportional to the number of tumor cells in the tissue, suggesting that ^{67}Ga was accumulated into tumor cells. However accumulation of ^{67}Ga was small in the tumor tissues undergoing marked degeneration and necrosis by radiation therapy. (3) In addition to the tumor tissues, ^{67}Ga was accumulated in large amounts into the tissues where inflammatory cellular infiltration was marked or many giant cells caused by foreign bodies appeared. In addition, effects of irradiation on the tumor tissues were studied in mice bearing Ehrlich's ascites tumor cell and the following results were obtained. (1) The growth of animal tumor was inhibited by localized irradiation of 1000rad, 2000rad, and 3000rad. Especially when 2000rad and 3000 rad were given, the growth of tumor showed three patterns of inhibition. Namely, the growth of tumor was temporarily inhibited: the growth of tumor was considerably inhibited, but several days later growth took place again: and the tumor disappeared completely. (2) The accumulation of ^{67}Ga into animal tumor tissues decreased with increasing severity of degeneration of tumor tissues by irradiation. (3) The amount of ^{67}Ga accumulated into tumor tissues was large in the tumor parenchyma, but was small in the necrotic lesion.

GALLIUM-67 SCANNING IN THE EVALUATION OF THERAPY OF LUNG CANCER.

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Gallium-67 scintigraphy was performed on 58-patients with a variety of primary lung cancers in order to (1) evaluate the radiosensitivity of the tumors before treatment, (2) predict the incidence of metastasis and (3) estimate the survival of the host-patient.

^{67}Ga scans were performed in all patients before treatment. These patients received irradiation therapy with more than 5000rad using ^{60}Co . The efficacy of the irradiation therapy was divided into 3-groups 1st group is ineffective or slightly effective, 2nd group is effective, 3rd group is markedly effective.

Method:

(1) Photodensity of the tumor(T) and the normal region(N) of the opposite lung of ^{67}Ga scintigram were measured with a densitometer at 20-points in the lung. (2) The tumor size(area) was measured with a planimeter from the chest X-ray and ^{67}Ga scintigram. The radius R was measured from the tumor size(area). (3) T/N/R value was considered to be a true ^{67}Ga scintigram concentration with consideration for the size of the tumor.

Results:

The mean ^{67}Ga uptake value(T/N/R) in a group of 11 patients with ineffective or slightly effective was 0.82, that in a group of 17-patients which were effective was 1.27 and that in a group of 30-patients that were markedly effective was 1.87. The ^{67}Ga uptake of the patients with metastasis, was greater than that of patients without metastasis in the cases of squamous cell carcinoma and anaplastic carcinoma. Furthermore, ^{67}Ga uptake of the patients in whom the survival is less than 6-month, was greater than that of patients in whom the survival was more than 6-month, despite histologic types except for adenocarcinoma.

Conclusion:

(1) The greater the ^{67}Ga accumulation in tumor, the more effective is irradiation therapy. (2) The greater the ^{67}Ga accumulation in tumor, the higher is the incidence of metastasis. (3) The greater the ^{67}Ga accumulation in tumor, the shorter is the host-survival.