

F. Tumor Diagnosis

Study of Subcellular Distribution and Binding Substances of ^{67}Ga , ^{111}In and ^{169}Yb in Tumor Tissue

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Subcellular distribution of ^{67}Ga , ^{111}In and ^{169}Yb was quantitatively determined to evaluate the role of lysosome in accumulation of ^{67}Ga , ^{111}In and ^{169}Yb in malignant tumor tissue and liver. The following animals and transplanted tumors were used: rats implanted with Yoshida sarcoma and hepatoma AH109A; mice implanted with Ehrlich tumor. ^{67}Ga , ^{111}In and ^{169}Yb -citrate were injected to the rats intravenously and to the mice intraperitoneally. Ten minutes to 48 hours after the administration of these radioactive substances, the animals were sacrificed, and the tumor tissues and liver were excised. Subcellular fractionation of tumor tissues and liver were carried out according to the method of Hogeboom and Schneider. ^{67}Ga and ^{111}In and ^{169}Yb of each fraction was counted by a well type scintillation counter, and protein of each fraction was measured according to Lowry's method.

In Yoshida sarcoma and Ehrlich tumor, most of the radioactivity was localized in the supernatant fraction, and small amount of radioactivity

was accumulated in the mitochondrial fraction (lysosome contains in this fraction). But in the liver, most of the radioactivity was concentrated in the mitochondrial fraction and the radioactivity of this fraction was increased with the passage of time after administration. Twenty-four hours later, about 50% of total radioactivity was accumulated in this fraction. In the case of hepatoma AH109A, radioactivity of mitochondrial fraction was increased with time after administration, and about 30% of total radioactivity was concentrated in this fraction 24 hours after administration.

From these results it is concluded that lysosome does not play an important role in the tumor concentration of ^{67}Ga , ^{111}In and ^{169}Yb and lysosome plays an important role in the liver concentration of ^{67}Ga , ^{111}In and ^{169}Yb . In the case of hepatoma AH109A it is presumed that lysosome plays considerably important role in the tumor concentration of ^{67}Ga , ^{111}In and ^{169}Yb , as hepatoma AH109A remains some nature of liver.

Study of Distribution of ^{67}Ga , ^{111}In and ^{169}Yb in Tumor Tissue by Macroautoradiography and Histological Method

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The localization of ^{67}Ga , ^{111}In and ^{169}Yb in tumor tissues was determined macroautoradiographically. ^{67}Ga -citrate, ^{111}In -citrate and ^{169}Yb -citrate were injected intravenously to the rats subcutaneously transplanted Yoshida sarcoma and were injected intraperitoneally to the mice subcutaneously transplanted Ehrlich tumor. These

animals were sacrificed 3, 24 and 48 hours after injection. These tumor tissues were frozen in *n*-hexane (-70°C) cooled with dry ice-acetone. After this, these frozen tumor tissues were cut into serial thin sections ($10\ \mu\text{m}$) in the cryostat (-20°C). One of the slice of these sections was then placed on X-ray film and this film was developed after