The Studies on the Developmental Process of the Experimental Osteogenic Sarcoma by ^{87m}Sr-Scintiscanning

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In our laboratory, the development of the experimental osteogenic sarcoma using Beryllium compounds had repeatedly been studied since 1955.

The tumor which were induced by the local injections of 0.5 cc of two percent saline solution of Beryllium carbonate into the femurs of the rabbit were resembled to the human osteogenic sarcoma.

The injection was done once a week and amount of Beryllium carbonate was 0.3 g in total.

We used the opposite femurs as the control.

X-ray and histological examinations and ^{87m}Sr-scintiscanning (external counting, profile scanning and area scanning) were done every months.

Now we would like to talk about comparative studies between X-ray, histological and scintimetrical findings of the developmental process of the tumor.

The conclusions were as follows;

By the X-ray examinations only slight periosteal thickenings were recognised at one to four months after the begin of injection. The typical osteogenic sarcomas were seen in the shaft of the femurs between ten and twelve months.

By the histological examination tumor cells and tumorous osteoid tissue were observed in the specimens of ten months after the begin of injection.

The external counting by the injection of 500 μCi of ^{87m}Sr at ten months after the begin of injection showed remarkably increased concentration of the isotope in the femurs which had repeatedly been injected with Beryllium carbonate.

The profile scanning showed high degree of uptake of the isotope in the femur into which Beryllium carbonate had been injected. We suggested that this finding indicated the process of the development of the tumor.

The area scanning showed high degree of uptake of the isotope even at three months after the begin of injection, and at ten months the concentration of the tracer increased much more. We would like to say that these findings determined the extent of the tumor.

^{111}In Tumor Scanning and Its Mechanisms Studied in the Rabbit

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One of the drawback of ^{67}Ga-citrate in its daily clinical application is its rather great affinity to infective lesions beside tumors. ^{111}In was studied to see if it possesses any merits over ^{67}Ga in these regards.

25 rabbits underwent intramuscular implantation of VX-2 epidermoid carcinoma in the left thigh. 7 days later, they were exposed to 540 μCi of ^{111}In-chloride intravenously. ^{111}In was cleared exponentially from the blood with $T_{1/2}$ of 9 hr in VX-2-rabbits. Up to 20% given dose of ^{111}In was excreted into feces in 7 days. Less was excreted into urine.

When autopsied and radioassayed, kidney, bone marrow, spleen, and liver deposited more of radioactivity than tumor. Ratio of tumor

activity to that of blood rose significantly on day-3 and thereafter. Staphylococcal and streptococcal abscesses deposited ^{111}In, but much less than the tumor.

On paper electrophoresis of serum collected at 24 hr post-^{111}In, radioactivity was seen localized in beta-globulin region. Gel filtration with Sephadex G-200 revealed similar results.

Subcellular distribution of $^{111}InCl_3$ was studied in VX-2 tumor and host ilver. Its distribution was identical except that more radioactivity was seen in VX-2 solube fraction than that of liver.

Administration of ^{111}In in citrate form could not significantly improve tumor deposition of the radioistotope from chloride form.

^{111}In yields a rather high ratio of tumor to blood and to muscle, and was confirmed to be one of the best tumor-scanning agents in the experimental VX-2 carcinoma in the rabbit. Infective lesions deposit much less radioactivity than in the case of ^{67}Ga; however, further studies are needed before definitive conclusions are drawn.

Study for Diagnosis of Malignant Tumor by the Measurement of Tumor Blood Flow Using ^{133}Xe Clearance

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The tumor blood flow should be different in relation to malignancy, if there were a difference on the amount of the blood vessels between malignant and benign tumor.

Using the substaneous tumor (26 cases) and breast tumor (21 cases), we worked out to estimate the tumor blood flow by ^{133}Xe clearance curve, obtained by ^{133}Xe injection into the tumor directly.

From these studies, it was found that there were no difference on the blood flow between them, and the measurement of the tumor blood flow did not aid for diagnosis of the malignancy. However, it was supposed that there were correlation between the amount of capillary and tumor blood flow.

Autoradiographic Analysis on Cell Proliferation of Carcinogenic Tumors in the Mice Fore-Stomach

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The papilloma and the squamous cell carcinoma are induced at the fore stomach in the d-d mice by giving orally the water containing DMBA (7,12-dimethyl benzanthracene).

We studied on the kinetic analysis of cell proliferation in the papilloma and the squamous cell carzinoma by using the ^{3}H-thymidine autoradiography (cumulative labelling method). In the papilloma, the cell proliferation at the head increased comparing at the neck.

Two types are found in the squamous cell carcinoma: one is keratoid, the orther non-keratoid. The cell proliferation of the keratoid is slightly earlier than non-keratoid one.

It is much interested that the cell proliferation of the papilloma at the head is similar to one of the squamous cell carcinoma.