studies both in vivo and in vitro on incorporation of various metals by cancer cells, compared their results with those from ^{169}Yb-citrate.

Isotopes to be tested were s.c. or i.p. injected at certain intervals to ddN mice, which preliminary received s.c. or i.p. transplantation of Ehrlich's ascites tumor cells, and uptake of the isotopes by these cells were comparativey investigated. Besides ^{169}Yb, were used ^{54}Mn, ^{59}Fe, ^{60}Co, ^{65}Zn, ^{86}Rb, ^{115m}Cd (all these as chloride), ^{67}Ga citrate and ^{203}Hg (as various compound).

Results: Ehrlich's tumor cells were i.p. or s.c. transplanted, and ^{169}Yb was given i.p. or s.c. at 4 days or 12 days thereafter, and the uptake of the isotope by the tumor cells and other organs were investigated after intervals of 3 days and more, to be compared with uptakes of other metal muclides, In all the cases, ^{169}Yb was most abundantly incoporated in bone, followed by the kidney (or liver); about next in order came the tumor. The uptake of this grade can not be said especially satisfactory in comparison with uptakes of other nucleides (^{65}Zn, ^{54}Mn, etc).

^{169}Yb has raised a problem concerning its irradiation dose because of its retention in bone. It is therefore necessary to take adequate countermeasure after its application. The authors attempted removal experiments with mice, using various chelating agents, and found that DTPA was most effective, followed by EDTA.

On the basis of the above results, the author criticized the socalled cancer-affinity, and brought out a question for the future study on this point.

Affinity for a Malignant Tumor and Bone of Thulium-167

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The higher atomic number rare earth radionuclides have been reported to concentrated in nonosseous tumor tissues (Hisada, K. and Ando, A., J. Nucl. Med. **14** 615, 1973). In various rare earth radionuclides, thulium (Tm-170) showed the highest relative uptake in Yoshida sarcoma. In radioisotopes of thulium-170, thulium-167 has excellent physical properties in its γ-ray energy (208 keV) and its physical half life (9.6 days) for clinical use.

The method of manufacturing thulium-167 with linear accelerator has been investigated by us. Some thulium-167 was recently produced by this method (this method was reported by coworker in the section of radiopharmaceuticals in this meeting.). ^{167}Tm (carrier free and containing stable thulium 5 μg and 50 μg) were administered to rats (both Yoshida sarcoma-bearing rats and rats with fractured tibia) by tail vein in the citrate form, respectively. And these rats were sacrificed at 3, 24 and 48 hours after injections of each perparation. The radioactivities of tumor, blood, muscle, liver, kidney, bone and callus were measured by a well-type scintillation counter, and retention values in every tissue including tumor were calculated (in per cent of administered dose per g·tissue weight). From these values, the values of

concentration ratios of these compounds between tumor and other organs, between bone and other organs were calculated. At 24 hours after the administration, retention values (%/g) of ^{167}Tm (carrier free) in tumor tissue was about 0.8%/g, and tumor/blood, tumor/muscle, tumor/liver, tumor/kidney and tumor/bone ratios were 67.7, 78.7, 1.6, 0.5 and 0.3, respectively. Two preparations (carrier free and stable thulium 5 μg) were similar in tumor localizing ability, and had very strong affinity to bone, especially to callus, but the preparation (stable thulium 50 μg) was inferior to another two preparations in the viewpoint of tumor and bone affinity.

On Tumor Affinity of Ruthenium (Experimental and Clinical Trials)

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We have conducted experimental and clinical evaluations of $^{103}RuCl_3$, $^{97}RuCl_3$ and ^{103}Ru-citrate, whether or not they can be used as tumor scanning agents.

Preceding clinical evaluations of the tumor scan agents, we examined experimentally the distribution of RI in each organ of solid tumor (AH-130) bearing rats and Ehrlich carcinoma-bearing mice. Tumor organs ratio for $^{103}RuCl_3$ in rats bearing solid tumor (AH-130) taken at 48 hours after injection are summarized as follows: ratio of tumor to liver is 0.52 ± 0.12 ; to kidney, 0.81 ± 0.23 ; to lung, 1.28 ± 0.24 ; to blood, 1.72 ± 0.58 and to muscle 5.28 ± 3.21. And mice bearing Ehrlich carcinoma showed similar distribution but $^{97}RuCl_3$ and $^{103}RuCl_3$ were not disposed so quickly from the blood as ^{103}Ru-citrate.

Clinical trials: Each patients was given 300 μCi of $^{103}RuCl_3$ intravenously, scans were taken twice at 2 and 6 days after injection with a Pho/Gamma III camera, 5-inch NaI scintillation scanner and used a data processor with 32K bit memory. We examined 16 patients various diseases; 13 cases of them were of malignant tumor, one case each of radiation pnuemonitis, loculated pleurisy and pulmonary tuberculosis respectively, a positive delineation was formed in 10 cases of 13 cases with malignant tumor. Radiation pnuemonitis and pulmonary tuberculosis showed positive delineation. Three cases with malignant tumor revealed a negative delineation, which may be divided into 3 cases of lung metastasis of osteogenic sarcoma, hepatoma, and susp. of liver tumor (a filling defect with ^{198}Au). However, two cases of hepatoma and susp. of liver tumor gave a negative delineation with ^{67}Ga-citrate.

We concluded that $^{103}RuCl_3$ is a useful tumor scanning agent, but blood clearance is slower than that of ^{103}Ru-citrate, so that mediastnum is not clearly visible. Our experimental results suggest that ^{97}Ru-citrate is a better agent for the tumor scan than $^{103}RuCl_3$.