

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  $^{167}\text{Tm}$  (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  $\mu\text{g}$ ) were similar in tumor localizing ability, and had very strong affinity to bone, especially to callus, but the preparation (stable thulium 50  $\mu\text{g}$ ) 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  $^{103}\text{RuCl}_3$ ,  $^{97}\text{RuCl}_3$  and  $^{103}\text{Ru}$ -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  $^{103}\text{RuCl}_3$  in rats bearing solid tumor (AH-130) taken at 48 hours after injection are summarized as follows: ratio of tumor to liver is  $0.52 \pm 0.12$ ; to kidney,  $0.81 \pm 0.23$ ; to lung,  $1.28 \pm 0.24$ ; to blood,  $1.72 \pm 0.58$  and to muscle  $5.28 \pm 3.21$ . And mice bearing Ehrlich carcinoma showed similar distribution but  $^{97}\text{RuCl}_3$  and  $^{103}\text{RuCl}_3$  were not disposed so quickly from the blood as  $^{103}\text{Ru}$ -citrate.

Clinical trials: Each patients was given 300  $\mu\text{Ci}$  of  $^{103}\text{RuCl}_3$  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 pneumonitis, loculated pleurisy and pulmonary tuberculosis respectively, a positive delineation was formed in 10 cases of 13 cases with malignant tumor. Radiation pneumonitis 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  $^{198}\text{Au}$ ). However, two cases of hepatoma and susp. of liver tumor gave a negative delineation with  $^{67}\text{Ga}$ -citrate.

We concluded that  $^{103}\text{RuCl}_3$  is a useful tumor scanning agent, but blood clearance is slower than that of  $^{103}\text{Ru}$ -citrate, so that mediastinum is not clearly visible. Our experimental results suggest that  $^{97}\text{Ru}$ -citrate is a better agent for the tumor scan than  $^{103}\text{RuCl}_3$ .