

89

LOCALIZATION OF RADIOLABELED ANTIBODY TO AHPHA-FETOPROTEIN IN RATS WITH TRANSPLANTED HEPATOMA AND PATIENTS WITH HEPATOMA. N. Ishii, T. Koji, A. Nakazima, F. Tagawa, H. Tsukada, H. Hirai. Nagasaki University School of Medicine and Hokkaido University School of Medicine. Nagasaki and Sapporo.

The purpose of this study is to demonstrate the specific localization of radio-labeled anti-AFP antibody in AFP producing tumor. In rats bearing subcutaneous transplants of AH-7974 ascites hepatoma, scintigrams 48-168 hours after i.v. injections of  $120\mu\text{Ci}$  of I-125 labeled anti-rat AFP horse antibody showed remarkable uptake on the tumors. The tumor/blood ratio in the treated group was four times higher than that of the control group. Autoradiograms using fixed sections showed grains localized on the tumor cells. In two patients with hepatoma showing high level of serum AFP, we performed the photoscan using I-131 labeled anti-human AFP horse antibody. In a patient showing serum AFP level of 55,670ng/ml, tumor location could be demonstrated at 48 hours after the injection, using the computer subtraction of background radioactivity of Tc-99m labeled human serum albumin from the antibody's I-131 activity. The results showed the diagnostic usefulness of the approach in human cancer which produced AFP.

90

SCINTIGRAPHIC DETECTION OF TSH RECEPTOR IN THE THYROID NEOPLASM. K. Kusakabe, T. Yamasaki, S. Kurihara and H. Akiba. Tokyo Women's Medical College. Tokyo.

The possible use of TSH as an agent for the detection of TSH receptor in the tumor of thyroid was studied. Three patients with thyroid cancer and three patients with adenoma of thyroid were scanned with I-131 TSH. The bovine TSH was labeled with I-131 according to the method of Chloramin T. Imaging was performed with a rectilinear scanner at 15 minutes, 1 hour, 3 hours and 24 hours after administration of approximately  $200\mu\text{Ci}$  of I-131 TSH. Out of three patients with hyperfunctioning adenoma, two showed remarkable tumor uptake in the I-131 TSH scans. In two patients out of three with thyroid cancer, uptake in lymphnode metastasis after total thyroidectomy was found in I-131 TSH scans. No inorganic iodine could be detected in rat thyroid tissue following injection of I-131 TSH by the paper chromatography. Tissue uptake studies done in rats with tritium-labeled TSH showed a high uptake in the thyroid tissue compared to other organ. These results demonstrate that images of thyroid neoplasms can be obtained by the binding of TSH to TSH receptors.

91

ACCUMULATION OF Tc-99m INTO TUMOR BY POLYNUCLEAR COMPLEXES (I): CHEMICAL FACTORS AFFECTING ON THEIR IN VIVO DISTRIBUTIONS. A. Yokoyama, K. Horiuchi, H. Tanaka, H. Saji, R. Morita and K. Torizuka. Pharmaceutical Sciences and School of Medicine, Kyoto University Kyoto.

As previously reported, we found in vitro study using Ehrlich tumor cells that some polynuclear complexes (polymer) of Tc-99m such as citrate, DMSA and pyrophosphate complexes, showed higher tumor cell uptake than Ga-67 citrate. In this paper, the importance of the polymer state in vivo is analyzed, and its cell uptake mechanism is discussed, based on chemical equilibrium of complexes in blood as well as the biological behavior of dissociated species, hydrolyzed metal ion and ligand. Several Tc-99m (Tc-99m) penicillamine complexes in different chemical states having different molecular weights, Tc oxidation states, stabilities, and so on are prepared and their bio-distribution are studied in Ehrlich tumor bearing mice. Different distribution of radioactivities on bone, kidney, liver and tumor are observed, but above all the mentioned chemical characters play important roles on the relative accumulation of Tc activities in those tissues. These results lead us to study Tc-99m DMSA polymer complex and a new kind of Tc-99m radiopharmaceutical for tumor diagnosis is developed based on this Tc-99m polymer concept.

92

ACCUMULATION OF Tc-99m INTO TUMOR BY POLYNUCLEAR COMPLEXES (II): EFFECT OF Fe-NTA ON TUMOR TO BLOOD RATIOS OF Ga-67-CITRATE AND Tc-99m-DMSA. H. Saji, R. Morita, K. Torizuka, A. Yokoyama, N. Hata, A. Misaki and H. Tanaka. School of Medicine and Pharmaceutical Sciences, Kyoto University, Kyoto.

As previously reported, a polynuclear complex of Tc-99m-DMSA, prepared under a special labeling condition, was found to possess similar chemical properties to Ga-67-citrate having high tumor accumulation in Ehrlich tumor bearing mice. Both compounds, however, present slow radioactivity blood clearance. Fe-Nitrilotriacetate (NTA) is proposed as a new approach to enhance tumor to blood ratio by increasing blood clearance. Fe-NTA was administered immediately or 30 min after Ga-67-citrate or Tc-99m-DMSA. Iron exchange reaction rate from Fe-NTA to transferrin (Tf) is known to be very rapid; administration of Fe-NTA was speculated to accelerate the release of radioactivity from its binding site on Tf and increase the blood clearance. In fact, as expected, Fe-NTA administration significantly enhanced target to nontarget ratio of 67-Ga-citrate and Tc-99m-DMSA in tumor. Considerable improvement of scintillation camera images in rabbit at 20 to 60 min postinjection was clearly observed. Thus, Fe-NTA holds considerable promise as a contrast enhancing agent for future clinical use.