The purpose of this study is to demonstrate the specific localization of radiolabeled anti-AFP antibody in AFP producing tumors. In rats bearing subcutaneous transplants of AH-7974 ascites hepatoma, scintigrams 48-168 hours after i.v. injections of 120μCi of I-125 labeled anti-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 53,670ng/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 produces AFP.

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-99 (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 Tc99m 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.