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FUNDAMENTAL STUDIES OF RADIOIMMUNOIMAGING WITH Ga-67 LABELED MONOCLONAL ANTIBODIES AGAINST HCG.

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Recently we have shown that the use of Deferoxamine (DFO) as a bifunctional chelating agent provided good evidence for its applicability to labeling monoclonal Ab with almost full retention of Ab activities.

In the present study, Ga-67 labeled monoclonal IgG or F(ab'), fragments against β -subunit of human chorionic gonadotropin (HCG), were prepared with full retention of Ab activities. DFO was conjugated with monoclonal Ab by a glutaraldehyde two step method and the obtained DFO-Ab conjugates were easily and completely labeled with Ga-67 chloride by mixing together within 30 min. Thus, biodistribution of Ga-67 labeled F(ab'), fragments of monoclonal Ab to HCG β -subunit was attempted in nude mice transplanted with HCG-producing human teratocarcinoma. Tumor could be visualized, in spite of relatively high background imaging of liver, kidney and spleen.

However, the inter- or intra- molecular cross linkage, demonstrated by Sephadex G-150 column chromatography, seemed to be responsible for the loss of Ab activities and the high liver uptake. Therefore DFO-coupling of Ab with the heterobifunctional chelating agent SPDP, in stead of glutaraldehyde, are under progress.

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IN VITRO UPTAKE OF RADIOPHARMACEUTICALS INTO TUMOR CELLS.

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It was reported that the radiolabeled PNA was one of tumor affinity agent. We investigated in vitro uptake of radiolabeled PNA,Ga-67-citrate and Tl-201-chloride into tumor cells. Ehrlich ascites tumor cell, Yoshida sarcoma cell,Lewis lung cancer cell and thyroid papillary adenocarcinoma cell were incubated with 100 μ Ci of Ga,100 μ Ci of Tl or 50 μ Ci of I-125-PNA at 37°C for 24 hours. The cell suspension was centrifuged, and the precipitated cells were washed. Then the radioactivity of cell pellets were measured with a well-type scintillation counter. The binding capacity of the radiopharmaceuticals to tumor cells was given as the percentage of the added dose per 10⁶ cells. The result showed that the uptake of I-125-PNA into Yoshida sarcoma cell was higher than that of any other radiopharmaceuticals. The uptake of I-125-PNA into Ehrlich ascites tumor cell was as same as that of Ga-67-citrate. The potential of radiolabeled PNA as a tumor affinity agent was obtained in the present in vitro study.

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RELATION BETWEEN THE TUMOR ACCUMULATION OF THALLIUM AND ALKALINE METAL IONS AND THE RADII OF THESE IONS. M.Katayama,A.Ando,I.Ando,T.Hiraki,N.Tonami,K.Hisada,H.Mori. Kanazawa University. Kanazawa.

This study was undertaken to elucidate the tumor-affinity mechanism of Tl-201. On the basis of observation by macroautoradiogram,concentration of Tl-201,Rb-86, and Cs-134 was more dominant in viable tumor tissue than in necrotic tumor tissue, but that of Na-22 was more dominant in necrotic tumor tissue than in viable tumor tissue. Furthermore, from the experiments of subcellular fractionation of tumor tissue treated with Tl-201,Na-22,Rb-86 and Cs-134, it was clear that most of these nuclides existed as free form in the fluid of tumor tissue.

On the other hand, it is well known that kalium ion exists in the intracellular fluid in the tissue, sodium ion existing in the extracellular fluid. In addition to these facts, the biological character of lithium ion is similar to that of sodium ion.

Considering the above-described results and ionic radii of Li⁺(0.68Å),Na⁺(0.97Å),K⁺(1.33Å),Rb⁺(1.47Å),Cs⁺(1.67Å) and Tl⁺(1.47Å), it is presumed that monovalent cations,whose ionic radii exceed 1.33Å, and which exist as free form in the fluid of tissue, behave like kalium ion.

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THE SIGNIFICANCE OF DELAYED Tc-99m-PMT IMAGING IN THE DIAGNOSIS OF HEPATOMA.

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To assess the value of delayed hepatobiliary imaging using Tc-99m-PMT in diagnosing hepatoma, 88 patients with various liver diseases, including hepatoma (49), cholangioma (4), metastatic liver carcinoma (10), and other liver diseases (25). In 49 patients with hepatoma, 20 (41%) showed increased uptake of Tc-99m-PMT in tumor as compared with radioactivity in the surrounding liver tissues, and equilibrated uptake by tumor occurred in 8 (16%). In contrast, no increased uptake of radioactivity in hepatic lesions was seen among 21 patients with localized liver diseases other than hepatoma. Tc-99m-PMT uptake by tumor was compared with serum AFP values in 30 patients with hepatoma. In 17 patients with serum AFP levels lower than 400 ng/ml, nine showed increased uptake of radioactivity by tumor. Findings of delayed Tc-99m-PMT imaging were compared with those of Ga-67 imaging in 43 patients with hepatoma. The hepatic lesions were positively visualized on delayed Tc-99m-PMT and/or Ga-67 images in 28 (65.1%) of the 43 patients.

The results obtained in the present study indicate that this technique is valuable for increasing specificity in the diagnosis of hepatocellular carcinoma.