The advantages of Tc-99m-DMS as a tumor-seeking agent

The exposure dose calculated by the MIRD method was as follows: total body 71 mrad/mCi liver 2.5 mrad/mCi, intestine 6.5 mrad/mCi (based on biodistribution of five mice), bladder 0.23 rad/mCi (based on urine cumulative ratio of human).

The thin layer chromatography and column chromatography (Sephadex G-50) revealed that Tc-99m-DMS in the blood was combined to plasma protein, with no detectable Tc-99m-SnCl₂ and relatively quick and its half-time was about 90 min.

The scintigram was taken between 2 and 3 hours after Tc-99m-DMS administration. It is well known that previous radiation caused Ga-67 accumulation in the salivary glands. However, previous radiation did not affect Tc-99m-DMS distribution, indicating that Tc-99m-DMS would be useful for the follow-up studies to the treatment in the head & neck tumors.

The study showed that Tc-99m-DMS would be a promising tumor seeking agent and useful in the detection of malignant tumors, to assess their sites and to follow the response to the treatment.

Several examples of alterations of biodistributions of radiopharmaceuticals as the results of toxicities have been reported in the patients receiving chemotherapeutic agents. In the present study, alterations of biodistributions of Ga-67 citrate and Tc-99m MDP were investigated in rats following treatment with various chemotherapeutic agents. Antibiotics of mitomycin C, adriamycin, daunomycin, bleomycin and gentamycin, antimitabolite of methotrexate, and miscellaneous agents of vincristin and cisplatin were studied. All of these agents were administered into rats on the same method and basis of mg/m² of maximum tolerated dose as that in man. 5-10mcroCi of Ga-67 citrate was administered into the tail vein of rats 4-5 days after treatment with chemotherapeutic agents, and 10microCi of Tc-99m MDP was also administered 18 hours following Ga-67 administration. 14mg/g tissue or organ of Ga-67 citrate 24 hrs after injection and that of Tc-99m MDP 3 hrs after injection were obtained. In these treated rats with cemothepathic agents, alterations of biodistributions were observed. Among them, alterations of kidney and liver uptakes were extremely remarkable.

In order to evaluate the usefulness of Tc-99m-Dimercaptosuccinic acid (DMS) as a tumor seeking agent, scintigraphic studies were performed on patients with various malignant tumors. Tc-99m-DMS was obtained at a labeling condition of a pH 8 and a very low concentration of SnCl₂, was injected intravenously and scintigraphy was taken at 2 or 3 hours after the administration using a conventional gamma camera. In some patients, the distribution was compared with Ga-67 citrate scintigraphy.

[Results] Preliminary study showed the different characteristics of Tc-99m-DMS and Ga-67 citrate distribution in the tumor diagnosis. Tc-99m-DMS was superior in the head and neck tumor and soft tissue tumors. It is well known that previous radiation caused Ga-67 accumulation in the salivary glands. However, previous radiation did not affect Tc-99m-DMS distribution, indicating that Tc-99m-DMS would be useful for the follow-up studies to the treatment in the head & neck tumors.

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