

42

Tc-99m CHELATING AGENTS : SYNTHESIS AND RADIORABELING OF DIAMINODITHIOL (DAT) ANALOGS. K.Shiba, H.Mori, H.Matsuda*, S.Tsuji*, and K.Hisada*, Radioisotope Center and School of Medicine*, Kanazawa University, Kanazawa.

In developing new Tc-99m labeled chelating agents, several diaminodithiol (DAT) analogs had two nitrogens and two sulfurs as ligands were prepared to determine the chemical structure and optimum radiolabeling conditions. The DAT analogs were synthesized from corresponding diimino compounds using NaBH_4 under -78°C conditions or using NaBH_4CN under acidic conditions lest the reaction of intramolecular cyclization should occur.

The structure of DAT analogs were determined by NMR, IR, Mass, and elemental analysis. Labeling of DAT analogs with Tc-99m were carried out using $\text{SnCl}_2 (1 \times 10^{-4} \text{ M})$ in various different pH (pH 5.0 - 10.0). All of the Tc-99m complexes showed high invitro stability and no free Tc-99m was detected in every pH (pH 5.0 - 10.0). Paper electrophoresis indicated the presence of neutral Tc-99m complex. These properties suggest that these ligands such as diaminodithiol (DAT) analogs are attractive compounds as a basis for future structural modification to develop new Tc-99m radiopharmaceuticals.

43

DEVELOPMENT OF RADIOIODINATED N-BENZOYL-GLUCOSAMINE DERIVATIVES FOR FUNCTIONAL STUDY OF GLUCOSE METABOLISM. Y.Magata, H.Saji, Y.Ohmomo and A.Yokoyama. Faculty of Pharmaceutical Sciences and School of Medicine, Kyoto University, Kyoto. Osaka Pharmacy College, Osaka.

Research on radiolabeling glucose derivatives with I-123 or radio metal nuclide is attracting great interest. Glucosamine derivatives interaction with hexokinase is well known. Phosphorylation by hexokinase is the limiting step of glucose metabolism. So, in the present work, a radioiodinated N-benzoyl-glucosamine (BGA) was synthesized and its biological functionality for the measurement of hexokinase activity was considered as of interest.

The synthesis was carried out by the introduction of iodobenzoyl group in the glucosamine amino group using the acid chloride method. Radioiodination with I-125 was carried out by the isotopic exchange reaction. Then, in vitro study with hexokinase showed no phosphorylation and non-competitive inhibition on glucose phosphorylation. In vivo experiments with mice showed high accumulation in organs of high hexokinase activity, namely, the pancreas. Good in vivo stability and very fast blood clearance were detected. No distribution in the brain probably due to lack of transfer through BBB. The gathered data offered new aspect for functional study of glucose metabolism.

44

BASIC STUDIES ON IODINATED BRANCHED CHAIN FATTY ACID. 1)Y. Yonekura, K. Yamamoto, M. Senda, 2)Y. Fujibayashi, K. Kawai, A. Yokoyama, 3)Y. Sakuma, M. Azuma, 4)K. Torizuka, and 5)F. F. Knapp, Jr. 1)Dept. of Radiology & Nuclear Medicine, 2)Dept. of Pharmaceutical Sciences, Kyoto Univ., Kyoto, 3)Nihon Medi-Physics, Chiba, 4)Fukui Medical School, Fukui, and 5)Oak Ridge National Laboratory, Oak Ridge, TN.

Among a variety of labeled fatty acid analogs introduced for the assessment of myocardial metabolism, branched chain fatty acids have been developed as a metabolic trapping tracer which may be suitable for gamma camera imaging as well as for SPECT. We studied the basic kinetics of one of these compound, p-iodophenyl-3-methylpentadecanoic acid (BMIPP) in the animals.

BMIPP showed relatively constant myocardial uptake in rats and rabbits, while the blood clearance was rapid and the liver activity gradually decreased. This resulted in the high myocardial to blood, lung, and liver ratios at 15 to 20 min after injection, indicating that superior myocardial images could be obtained by gamma camera or SPECT. In order to evaluate the possibility of metabolic imaging with this tracer, the uptake of BMIPP in these organs were also studied by changing the availability of the metabolic substrates in the blood.

45

FUNDAMENTAL STUDY OF SPECT IMAGES USING (p,2n)I-123 AND (p,5n)I-123. H.Ikeda, H.Hamada, K.Kosakai, M.Omura, Y.Shimonishi, A.Sazaki, T.Fukuda, H.Ochi, Y.Onoyama and Y.Onishi. Osaka City University Medical School, Osaka. Nihon Medi-physics Co., Ltd. Takarazuka.

The resolution, sensitivity, uniformity, linearity, cold and hot lesion detectability on SPECT were investigated using (p,2n)I-123 and (p,5n)I-123. The collimators used in this study were 140KeV high resolution (HR) and 300KeV parallel collimator (PL). The SPECT images with (p,5n)I-123 were superior in resolution (MTF), linearity, cold and hot detectability to that with (p,2n)I-123. Higher energy gamma-ray from (p,2n)I-123 such as I-124 degraded SPECT images by septum penetration through collimators. The results were shown in the Table below.

collimator	nuclear reaction	MTF	linearity	cold detect	hot detect
HR	(p,2n)	0.26	bad	22.3	22.3
	(p,5n)	0.29	best	11.4	14.3
PL	(p,2n)	0.21	good	17.9	14.3
	(p,5n)	0.23	better	14.3	11.4

MTF: the value is frequency (cycle/cm) at 0.5MTF

cold detect.: cold lesion size (mm ϕ) to be detected visually.

hot detect.: hot lesion size (mm ϕ) to be detected visually.