62

RAPID MINIATURIZED PAPER CHROMATOGRAPHIC RADIOCHEMICAL PURITY-CONTROL PROCEDURES FOR Tc-99m RADIOPHARMACEUTICALS. S.Sanada,A.Ando, T.Hiraki,I.Ando, and K.Hisada. Schools of Paramedicine and Medicine, Kanazawa University Kanazawa

The prevalent use of kits (on-site preparations) has increased the need for the rapid, simple and reliable procedures of radiochemical purity-control. The miniaturized paper chromatography is appropriate to meet these needs.

First various solvents (salin, mixed solution of methanol and diluted ammonia water (17:3), various diluted acetone, methanol and methylethylketone) were examined for selecting the adequate developing solvents for three kinds of phosphate labeled Tc-99m(pyrophosphate, MDP,EHDP) with the miniaturized paper chromatography (5mmX55mm Toyo-No.50 strips and 15mmφX80mm developing tube).

The results of these examination were compared to those obtained with both the standard methods described by the Welfare Ministry and the adsorption method to hydroxyapatite crystal.

The miniaturized paper chromatography using 80-90% acetone clearly separated free pertechnetate from labeled Tc-99m, and radiochemical purity determined by this procedure almost agreed with the other two.

The procedure presented is extremely rapid, easy and inexpensive to perform, and useful for routine determination of the labeling efficiency before administration to patients.

63

A MOLECULAR ORBITAL STUDY ON BONE-IMAGING RADIOPHARMACEUTICALS. H.Shinohara and Y.Koga. Dept of Radiology, Showa University Fujigaoka Hospital. Fujigaoka, Midoriku, Yokohama-shi.

The electron distribution of ethylenehydroxydiphosphonate (EHDP), methylenediphosphonate (MDP), and hydroxymethylenediphosphonate (HMDP) was calculated approxmately by the molecular orbital (MO) method in order to examine the physicochemical property of bone-imaging agents such as Tc-99m EHDP, Tc-99m MDP, Tc-99m HMDP. The basic concept of the MO method is to find approximate electronic wave functions for a molecule by assigning to each electron a one-electron wave function which in general extends over the whole molecule. The one-electron wave function (MO) was constructed from a linear combination of atomic orbital (AO) of the atoms in the molecule. The total N-electron wave function (Φ) which satisfies the Pauli principle is built up as an antisymmetrized product of MO's.

When an electronic state is represented by the normalized wave function, its electronic energy is given by

$$E = \int \bar{\Phi} H \Phi d\tau, \quad H = \sum_{\mu} H_{\mu} + \frac{1}{2} e^2 \sum_{\mu \neq \nu} \frac{1}{r_{\mu\nu}}$$

where H is the total hamiltonian operator. H_{μ} is the hamiltonian operator for the μth electron moving in the field of the nuclei alone, $r_{\mu\nu}$ is the distance between the μth and the νth electron. The present work is the first step of application of the MO method in nuclear medicine.