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DEVELOPMENT OF NEW CHROMATOGRAPHIC SYSTEMS OF RADIOPHARMACEUTICALS PRODUCED BY CYCLOTRON. M. Hayashi, H. Moriya, H. Eda and N. Toyota. Technical Department, NIHON MEDI-PHYSICS CO., LTD., Takarazuka

Radiopharmaceuticals produced by cyclotron (cyclotron RI) are put on the market in the form of injectable solutions and their radiochemical purities are tested using radiochromatography such as thin layer chromatography.

In this study, we evaluated new chromatographic systems for Ga-67, In-111 and Tl-201 in which chromatograms reflected the chemical forms of these isotopes. Ga, In and Tl are the group ⅢA elements and it is known that their chemical properties are similar to each other. In many cases when we use these elements for radiopharmaceuticals, the pH of the solution is neutral (Ga-67 citrate, In-111 DTPA).

Based on these facts, it could be guessed that unlabeled species in radiopharmaceuticals of these isotopes were hydrate form compounds. We examined the separation of unlabeled compounds (hydrate) from labeled compounds with thin layer chromatography using cellulose plate. Concerning the developing solutions, we chose aqueous solution since the labeled compounds were hydrophilic chelate compounds.

With these systems, we obtained favorable results in terms of the separation ability.

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THE MEASURING OF THE PARTICLE SIZE OF RADIOCOLLOID USING GEL FILTRATION COLLUMN CHROMATOGRAPHY Y.Hasegawa,S.Nakano, A.Noguchi,T.Hashizume and K.Ibuka THE CENTER FOR ADULT DISEASES OSAKA.

We have been measuring the particle size of several kinds of radiocolloid for lymphscintigraphy. In this report three methods were compared for sizing of Tc-99m-rhenium colloid particle. They were gel filtration(Sepharose 2B and 4B), electromicroscopy and membrane filter(Nucle pore filter). The particle size of the rhenium colloid determined by Sepharose 2B gel filtration was 33nm with the range between 25.0 and 41.2nm. It was difficult to measure the particle size of the rhenium colloid by electromicroscopy, because it had amorphous shape and inhomogenous density. Nuclepore filter was found not to be suitable for measuring the size of the rhenium colloid, because the greater part of the rhenium colloid paticle with diameter smaller than 50nm could not pass through the Nuclepore filter with pore size of 50nm. The above results indicate that the gel filtration with Sepharose 2B is the most favorable one among all three methods for measuring the size of the rhenium colloid.

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DETERMINATION OF STABLE IODINE CONTENT IN THYROID GLAND BY USING Tl-201 AND Tc-99m. R. Amano, A. Ando, T. Hiraki. The School of Allied Medical Professions, Kanazawa University. N.Tonami and K. Hisada. School of Medicine, Kanazawa University. Kanazawa 920.

A new technique, radioactive inplant X-ray emission spectrometry to determine the *in vivo* iodine content of the human thyroid is proposed. First, the effective excitation efficiencies of Tc-99m, Tl-201 and Am-241 for stable iodine atoms were compared. The Tl-201 was found to be the most efficient source to excite iodine atoms. The variations of counting rate and effective excitation efficiencies of Kα(28.6keV) with iodine content, thyroid volume and skin-thyroid distance were studied for the Tl-201 source to examine the properties of excitation and photon attenuation. The slight decrease in effective excitation efficiency with iodine content was found. On the ther hand, the both pronounced decreases with sample volume and skin-thyroid distance were observed. These facts cause several problems in the estimation of true concentration and detection limit of iodine. However these problems were solved by the evaluation of the effects by using the neighbor γ and X-rays emitted from Tl-201. As a result, the gland depth and volume could be estimated from the peak ratios of 30.7keV/167.6keV and 28.6keV/167.6keV. Using a 1 MBq Tl-201 implant source, the detectable minimum iodine concentration was found approximately 70μg/g for 2000 sec. measuring time in this phantom experiment. The effectiveness of the RIXE technique is discussed.

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A NEW METHOD FOR STANNOUS TIN LEVEL DETERMINATION IN KIT REAGENTS FOR TC-99M RADIOPHARMACEUTICALS USING Sn-Re REDOX COUPLING. M. Kato-Azuma and M. Hazue. Research & Development, Technical Department, NIHON MEDI-PHYSICS CO., LTD., Takarazuka.

A new method for the determination of stannous tin level has been developed. The stannous species [Sn(II)] to be tested was reacted with an excess amount of potassium perrhenate [KReO4, Re(VII)] in 2-3 N HCl solution which contains excess amount of ascorbic acid and sodium thiocyanate [NaSCN]. Under the condition, a redox reaction takes place [Re(VII)→Re(IV)/Sn(II)→Sn(IV)], and thus formed Re(IV) is immediately coordinated with thiocyanate ion to give Re-(IV)-SCN complex. The Re(IV)-SCN complex was then extracted into diisopropyl ether (DIPE) and the concentration was determined spectrophotometrically at the absorption maximum (363nm) against the blank solution as the reference. The established standard procedure provides the quantitative progress of the reaction: the absorbance value for the Re(IV)-SCN complex was found to be proportional to the amount of added Sn(II) over a wide range of the stannous level.

This new method bears several advantages over thus far reported ones: (1) stabilizer in Tc-kits (ascorbic acid, gentisic acid) shows no inhibitory effect, (2) various chelating agents (DTPA, HMDP, DMSA, HIDA, PMT, etc.) shows no masking effect, (3) the stannous level in Sn(II)-MAA reagent can be also determined, (4) the pH deviation of the samples gives no malefaction, (5) the method is simple enough for routine QC work, and (6) the results are highly reproducible.