Q. Institute and Control

Internal Radiation Dose of ^{99m}Tc Labeled Compaunds

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In nuclear medicine, the MIRD method is commonly used for the calculation of internal radiation dose and this method requires the bilogical and physical data.

For the physical data, the values of the tables of MIRD pamphlets can be applied to the MIRD Standard Man, but these values cannot be strictly applied to general Japanese Peoples, therefore, these values are corrected using the method of Yamaguchi et al, NIRS. The bilogical data are obtained with the Whole Body Scanner, C.D.S.-4096, CRT and light pen. The calculation is performed with electronic computer FACOM 230-28S and the results are written in Line Printer.

In present work, we measured ^{99m}Tc-phytate, -M.A.A., -D.M.S., -D.P. and calculation results of main organs are that for phytate, liver is 0.5 rad, pancreas is 0.7, total body is 0.04, with 2 mCi; for M.A.A., lungs are 0.9 rad, total body is 0.03, with 2 mCi; for D.M.S., kidneys are 1.14, rads, total body is 0.03, with 2 mCi; for D.P. skeleton is 0.2, total body is 0.1, with 10 mCi. Our calculation method is so simple that we can calculate the internal radiation dose easy when new medicine is developed in the future.

Assay of Radioactive Contamination in Short-Lived Radiopharmaceuticals

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The hosrt-lived radiopharmaceuticals like Tc-99m have rapidly increased their clinical uses in Japan year by year. The advantageous of short-lived radionuclides is to reduce radiation exposure to the patient administered. Concerning the waste disposal problems, the solid wastes containing any short-lived redionuclides can be easily disposed as non-contaminated ones after complete decay over a sufficient long period of time, it any contamination of radionuclides of long half-lives is ruled out.

The purpose of this study is to examine contamination of long half-lived radionuclides existed in short-lived radiopharmaceuticals commercially supplied. The radiopharmaceuticals labelled with Tc-99m I-123, Au-198, Tl-201, and Ga-67 were studied. Minute radioactivity remnant in them were measured by low background counter composed of 5×4-in NaI(Tl) crystal after more than thirty times of their physical half-lives. The gamma-ray spectrometries with a 200 channel analyser were offered for determination of radioactivity and kinds of radioactive impurities. The results were as follows.

Tc-99m samples supplied by one of two commercial agents showed photo-peaks at energies of 0.6 MeV and 0.8 MeV, considered as minute contamination of Cs-134. The amounts of Cs-134 activity were calibrated as 3.5×10^{-8} to 1.0×10^{-9} of initial Tc-99m activities. I-125 contamination in I-123 was measured after 6 months, presenting 0.18 to 0.5% of initial activities of I-123. The contamination in other radiopharmaceuticals was measured; Tl-202 in approximate 0.19% of Tl-21, Ir-192 and Ag-110m in 4×10^{-7} of Au-198, and Zn-65 in 4.6×10^{-6} of Ga-67.