

W. Contribution from the exhibitors (Work in Progress)

310

RESEARCH AND DEVELOPMENT OF Xe-133 VENTILATION STUDY SYSTEM (V.S.S.) H.Matsushima, N.Ueda, M.Kato-Azuma and M.Hazue. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

Since the original description of Xe-133 for pulmonary function investigations, this gaseous radionuclide has been used for the diagnosis of chronic obstructive pulmonary disease and other pulmonary diseases. Several disadvantages and complexities, however, have arisen in the course of the development of the clinical application of Xe-133, such as; 1) necessity of special equipment, 2) difficulty in the availability of Xe-133 gas of a constant radioactive concentration, 3) contamination of equipment and pollution to the environment from radioactive expired gas.

Currently, we developed a Xe-133 Ventilation Study System with a new Xe-133 delivery system, which could eliminate these disadvantages. The sole nuclidic impurity in this Xe-133 gas is I-131 and its content at calibration time is approximately 0.003%.

The change in Xe-133 blood concentration during and after inhalation was evaluated in several animal species using our Xe-133 V.S.S. The partition coefficient for Xe-133 between inhaled air and blood at equilibrium rebreathing was found to be $(2.98 \pm 0.14) \times 10^{-3}$ and $(2.85 \pm 0.61) \times 10^{-2}$ in rats and mice, respectively; the effective half-life for the blood concentration was found to be about 5.1 min for both animal species. In addition, the absorbed radiation dose was calculated on the basis of these results.

311

RESEARCH AND DEVELOPMENT OF Kr-81m GENERATOR FOR MEDICAL USE. M.Hazue, M.Kato-Azuma, S.Nakamoto and Y.Tanaka. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

We have started our research on Kr-81m generator aiming toward a multi-purpose system (for inhalation and injection). Rb-81 was produced with our CS-30 cyclotron via Kr-82(p,2n)Rb-81 reaction. Cation exchange resin Dowex 50wx8 was adopted as the adsorbent for Rb-81 because of its high trapping efficiency for Rb, simplicity in sterilization, etc. It was found that greater than 99.9% of Rb-81 was trapped by the resin at the loading and the nuclidic purity of the eluted Kr-81m was greater than 99.99%. Sterility and apyrogenicity were also established (Radioisotopes 26 25-29, 1977). Quantitative evaluation revealed that the observed generation kinetics of Kr-81m was identical to that expected with the theoretical consideration (Radioisotopes 26 179-181, 1977). The MIRD calculations were performed for inhalation, i.v. and i.carotid infusions (see, Abstracts No.82, 146 in this Meeting). A short half-life of Kr-81m (13 sec) enables us to use a large-dose administration and repeatable scintigraphy, and also eliminates the pollution to the environment. Moreover the gamma-ray energy (190 Kev) is quite suitable for the widely available gamma camera with a high resolution collimator. These superior physical properties of Kr-81m, together with the routine delivery of the generator system, should accelerate the clinical application of this novel radionuclide.

312

Tc-99m(Sn)PYRIDOXYLIDENEISOLEUCINE; RESEARCH AND DEVELOPMENT OF NEW HEPATOBILIARY IMAGING RADIOPHARMACEUTICALS. M.Kato-Azuma and M.Hazue. Technical Dept. NIHON MEDI-PHYSICS CO., LTD. Takarazuka, Hyogo.

A new method for the specific labeling of pyridoxylideneamines with Tc-99m has been developed using divalent tin as the reductant. The chromatographic and in vivo distribution properties of Tc-99m(Sn)pyridoxylideneamines were compared with those of the corresponding Tc-99m pyridoxylideneamines prepared by the autoclaving method.

In good conformity with our expectation, the biliary excretion of the new complexes correlated well with their molecular lipophilicity; the leucine, isoleucine, valine, and phenylalanine derivatives showed superior bio-distribution patterns in animals. These results could be understood systematically with the consideration of the presumed structure of the new Tc-complexes. Further studies, including the imaging of rabbits, toxicity and stability tests, lead us to the conclusion that Tc-99m(Sn)pyridoxylideneisoleucine [Tc-99m(Sn)PI] is the first choice for development. The establishment of a prolonged stability for the Tc-complex made it possible to distribute the radiopharmaceutical in its ready to inject labeled form.

As described above, Tc-99m(Sn)PI was born from a systematic research with the approach of structure/bio-distribution relationship, and the procedures for this research and development are significantly suggestive for future research on radiopharmaceuticals.

317

CLINICAL UTILITY OF HCG KIT AND B-HCG KIT. K.Izaka, Y.Kazahaya and I.Watase. Green Cross Corporation, Tokyo.

It was found that the specificity of the antiserum used in the kit(CIS) is high enough to determine an HCG level in the blood without or with the least interference from LH, and then the kit evaluated to be useful for diagnosis of the trophoblast and neoplasma with ectopic HCG production at the early stage.