Chronological Distributions of $^{99m}TcO_4$, $^{99m}Tc_2S_7$

H. KAKEHI, N. ARIMIZU, T. KASUGA, K. AKIBA, M. TATENO, Y. TATENO, K. SAEGUSA, H. NAGASAWA, N. YUI, G. UCHIYAMA and T. MORI

Department of Radiology, Chiba University School of Medicine, Chiba

Chronological distributions of $^{99m}TcO_4$, $^{99m}Tc_2S_7$ colloid and $^{99m}Tc\,(SCN)_5$ in rabbits, rats and men are studied.

$^{99m}TcO_4$: Area scannings of rabbits injected 2mc of $^{99m}TcO_4$ intravenuously, showed the area of high activity—mouth, thyroid, liver, bladder, heart and kidney. Rats are killed 10, 30 min. 1, 2, 3, 6, 12 and 24 hrs. after the i.v. injection, and brain, salivary glands, teeth, mucous membrane of mouth and pharynx, thyroid, heart, lungs, liver, spleen, pancreas, kidneys, stomach, intestines, blood and plasma, muscles, bone and bone marrow were taken out and the radioactivity in each organ or tissue was counted. In these organs, thyroid, stomach, blood, liver, kidney and mucous membrane of mouth had high specific activities. Homogenates of thyroid gland are ingested by pancreatin and served as the samples of paperchromatography. Paperchromatography after Roche's method showed that the peak of $^{99m}TcO_4$ is different from the peak of ^{131}I. The same is observed with plasma. $^{99m}TcO_4$ thyroid uptake is calculated on 15 euthyroid and 8 hyperthyroid patients. The values of this test showed under 5% in euthyroid, and 7—48% in hyperthyroid patients. The absorption of $^{99m}TcO_4$ from stomach and intestines is slower than ^{131}I. Disappearance from the blood is also slower than ^{131}I.

$^{99m}Tc_2S_7$ colloid is accumulated in liver, spleen, bone marrow in higher specific activity.

$^{99m}Tc(SNC)_5$ is gathered in the lung and the liver.

Milking and Calibration of ^{99m}Tc

H. KAKEHI, K. SAEGUSA, and K. AKIBA

Department of Radiology, Chiba University School of Medicine, Chiba

^{99m}Tc is obtained as the daughter product of ^{99}Mo-Cow. The short physical half-life of six hours, the absence of beta emission, and the 140 keV gamma emission make it possible to administer a large amount of radioactivity without excessive irradiation to the patient. ^{99}Mo is absorbed on a chromatographic alumina column in a lucite tube.

^{99m}Tc can be eluted as the pertechnetate ion from the alumina column with approximately 20 ml of 0.9% NaCl solution. After the elution, maximum growth of radioactivity of the ^{99m}Tc daughter occurs in 23 hours. So we can get ^{99m}Tc elution out of the column once a day.

The eluate is contaminated by ^{131}I, ^{103}Ru and ^{106}Ru. Ruthenium is removed easily by the extraction of TcO_4 from 5N NaOH into methyl ethyl ketone.

If the H_2S is added to the acid pertechnetate solution (1N MCl), the technetium activity will be precipitated along with the elemental sulfur, as colloidal Tc_2S_7 in the presence of 1% gelatin.

Pertechnetate is reduced to the +5 state by the ascorbic acid in 2.5N HCl. When it reacts with KCNS, a fat soluble thiocyanate will be made. The calibration of a source must be carried out routinely prior to the administration to a patient. Using a Lauritsen electroscope and an ionization chamber and comparing with a standard source of Co-57, we can obtain a relatively right value in a short time. The dilution method comparing with a weak Co-57 standard source in well scintillation counter is relatively complicated.