

Comparisons of the time-activity curves of the cardiac blood pool and liver uptake by ^{99m}Tc -GSA dynamic SPECT and measured ^{99m}Tc -GSA blood concentrations

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Objectives: The aim of this study was to determine the time-activity curve in the cardiac and hepatic region by ^{99m}Tc -GSA dynamic SPECT which is clinically used in liver scintigraphy and evaluate the temporal changes in the consistency and errors at the absolute scale using the regression equation of changes in the blood concentration of ^{99m}Tc -GSA. **Methods:** In 11 patients who underwent ^{99m}Tc -GSA dynamic SPECT over the 30 min period after IV injection, the percentages of activity in the collected blood and in the blood pool estimated by dynamic SPECT were determined as the plasma clearance by blood collection and as the blood clearance by cardiac pooling. Extrahepatic uptake, expressed as $100 - (\% \text{ uptake in the liver by dynamic SPECT } (\%))$ was calculated as the blood clearance by the liver. The regression equation ($Y = Y_0 + Ae^{-\alpha t}$) was determined from the changes in the counts, expressed as a percent. Percent errors and the differences in the Y -intercept (Y_0), coefficient (A) and slope (α) on the regression curve were compared. **Results:** Blood pool clearance gradually exceeded the measured plasma clearance. The clearance by the liver started from a very low initial value and gradually became equal to that of plasma clearance over the first 15 minutes and exceeded it over the second 15 minutes. The Y -intercept was significantly higher in the blood pool clearance than that in the measured plasma clearance ($p < 0.001$), and the coefficient was significantly lower in the former than the latter ($p < 0.001$). The coefficient and slope were significantly lower in the hepatic clearance than the plasma clearance ($p < 0.001$, $p < 0.005$). **Conclusion:** The time-activity curve of the blood pool showed a tendency towards overestimation in the second half of the examination, probably due to scatter effect from the liver. The time-activity curve of liver uptake showed a tendency towards overestimation in the first half of the examination, probably due to the high concentration in the hepatic blood pool, and underestimation in the second half.

Key words: ^{99m}Tc -GSA, SPECT, liver, blood-pool scintigraphy