

Binding rate constant of Tc-99m DTPA galactosyl human serum albumin measured by quantitative dynamic SPECT —Clinical evaluation as a total and regional liver function test—

Koichiro YAMAKADO,* Kaname MATSUMURA,* Yoshiyuki TAKASHIBA,* Atsuhiko NAKATSUKA,*
Tokio KITANO,* Takashi ICHIHARA,*** Hisato MAEDA,****
Kojiro TAKASE** and Kan TAKEDA*

*Department of Radiology, **First Department of Internal Medicine, Mie University School of Medicine
***Toshiba Medical Engineering Laboratory
****Fujita Health University School of Health Science

To evaluate the clinical utility of a new method with dynamic single photon emission computed tomography (SPECT) and scatter and attenuation compensation to estimate both total and regional liver function quantitatively. Five controls, 20 patients with chronic liver disease, and 2 patients with Budd-Chiari syndrome were studied. Dynamic liver SPECT data were acquired during 20 minutes after injection of Technetium (Tc)-99m diethylenetriaminepentaacetic acid (DTPA) galactosyl human serum albumin (GSA) with scatter and attenuation compensation. The binding rate constant of Tc-99m GSA (K_{li}) was derived quantitatively from the Patlak plot based on kinetic models for GSA receptor binding. The mean K_{li} was obtained by dividing the K_{li} value (total K_{li}) by the liver volume. Both total and mean K_{li} were significantly lower in patients with chronic liver disease than in controls (302 ± 112 vs. 523 ± 78 ml/min; $p < 0.001$, 0.26 ± 0.11 vs. 0.43 ± 0.03 ml/min/cm³; $p < 0.001$). In the patient group, both total and mean K_{li} were significantly correlated with the results of conventional liver function tests and the histological severity of chronic liver disease. In 2 patients with Budd-Chiari syndrome, the mean K_{li} was lower in the right lobe, where the hepatic veins were occluded, than in the left lobe, where draining veins were patent. In conclusion, this method is a reliable diagnostic technique for estimating total and regional liver function.

Key words: dynamic SPECT, Tc-99m DTPA galactosyl human serum albumin, liver function test, chronic liver disease, Budd-Chiari syndrome