

## Clinical assessment of hepatic functional reserve using $^{99m}\text{Tc}$ DTPA galactosyl human serum albumin SPECT to prognosticate chronic hepatic diseases —Validation of the use of SPECT and a new indicator—

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**Rationale:** It is generally known that scintigraphy of  $^{99m}\text{Tc}$  diethylenetriamine pentaacetic acid-galactosyl human serum albumin ( $^{99m}\text{Tc}$ -GSA) is useful for assessing hepatic functional reserve. For hepatic functional indicators, the index of the calculated planar image has been used in previous studies. However, there have been few reports that suggest that the indicators calculated from static SPECT data would be useful for the assessment of hepatic function. The aims of this study were to establish a simple method for assessing hepatic functional reserve using the liver SPECT of  $^{99m}\text{Tc}$ -GSA and to apply this method for rich stratification in patients with chronic hepatic diseases.

**Methods:** A liver phantom (a 50% concentration of  $^{99m}\text{Tc}$  solution) was used to compare the planar and SPECT methods. According to the definition of the new indicator, the liver SPECT of  $^{99m}\text{Tc}$ -GSA was divided by a syringe SPECT of  $^{99m}\text{Tc}$ -GSA and was called the liver uptake ratio (LUR). We correlated the LUR and the liver uptake ratio calculated according to the blood-sampling method.  $^{99m}\text{Tc}$ -GSA SPECT was performed in 137 patients with hepatic diseases, including chronic hepatic diseases, and 20 healthy volunteers. The LUR was correlated between the formed subtypes for all subjects. **Results:** The acquired phantom-count ratio calculated by the SPECT method was more accurate than that acquired by the planar method. A good correlation was obtained between the LUR and the blood-sampling method ( $r = 0.971$ ). The LUR was significantly lower in subjects with severe cirrhosis than in healthy subjects or those with chronic hepatitis and mild cirrhosis, and it was significantly lower in subjects with chronic hepatitis and mild cirrhosis than in healthy subjects. The LUR was significantly correlated with other hepatic function tests. Based on LUR, the chronic hepatic diseases were divided into two groups: Group A, with LURs 30% and higher, and Group B, with LURs below 30%. An LUR of 30% marked the 25th percentile of the mild-cirrhosis group. The cumulative survival rates were lower in Group B than in Group A. **Conclusion:** The SPECT method was superior to the planar method for assessing LURs. LUR was a suitable indicator of  $^{99m}\text{Tc}$ -GSA clearance from the blood pool and of binding to the asialo-glycoprotein receptor. LUR is a simple and clinically useful indicator for the assessment of hepatic functional reserve in chronic hepatic diseases.

**Key words:**  $^{99m}\text{Tc}$  DTPA galactosyl human serum albumin, SPECT, hepatic functional reserve