

Relationship Between Gd-EOB-DTPA MRI and Tc-99m-GSA for Quantitative Evaluation of Liver Function

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OBJECTIVES

The usefulness of Tc-99m-galactosyl human serum albumin (GSA) has been reported to evaluate liver functions. The use of a hepatocyte-specific contrast agent, Gadolinium ethoxybenzyl diethylenetriaminepentaacetic acid (Gd-EOB-DTPA ; Primovist, Bayer Schering Pharma AG, Berlin) can be used as a tracer for quantitation of the hepatic functions. The purpose of this study is to evaluate relationship between Tc-99m-GSA scintigraphy and 3T-MRI using Gd-EOB-DTPA for quantitative liver function.

MATERIALS AND METHODS

Nineteen patients with liver tumor were included in this study. The patients consisted of 12 with hepatocellular carcinoma, 5 with metastatic liver tumor, and 3 with cholangiocellular carcinoma. The group was made up of 13 men and 6 women with ranging from 31 to 76 years (mean 65 years). All patients underwent Tc-99m-GSA and MRI using Gd-EOB-MRI, the intervals of two examinations were within one month. The hepatic uptake ratio of Tc-99m-GSA (LHL15) was calculated after injection of Tc-99m-GSA by dividing the liver activity at 15 min by heart plus liver activity at 15min. Signal intensity of liver at pre-injection, at 4min post-injection, at 20min post-injection, and spleen at 20 min was defined as the mean signal from a semi-circular ROI of 150mm², and mean signal intensity was calculated (mSIpre, mSI4min, mSI20min, mSIsp): mean signal intensity was defined the mean value of SI measured by lateral and internal segment of left lobe, anterior and posterior segment of right lobe. Liver activity at 15 min (LHL15) by Tc-99m-GSA scintigraphy was compared with the spleen to liver ratio at 20 min post-injection (mSIsp / mSI20min), the increased ratio at 4 min (mSI4min / mSIpre) or 20 min (mSI20min / mSIpre).

RESULTS

There was significant correlation between LHL15 and the increased ratio at 4min ($r=0.80$, $p<0.00005$), and the increased ratio at 20 min were also well correlated ($r=0.67$, $p<0.0005$) (Fig.1). However no statistically significant correlation was observed between LHL50 and the spleen and liver ratio.

CONCLUSION

At 3T-MRI using Gd-EOB-DTPA, the signal intensity ratio of liver at pre- to post-injection (especially 4min) showed statistically significant correlation with LHL15 value by Tc-99m-DTPA scintigraphy. Therefore it could be possible to use Gd-EOB-MRI for quantitative liver function as well as Tc-99m-GSA scintigraphy.

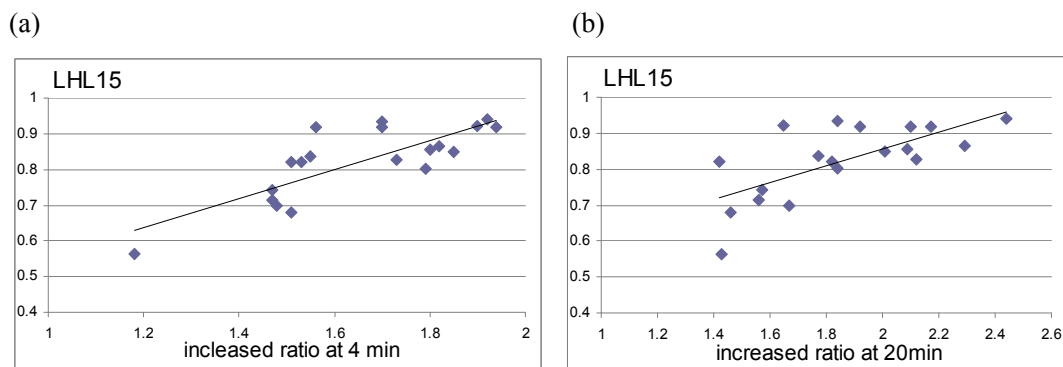


Figure.1 Correlation between LHL15 and the increased ratio at 4 min (a) and 20min (b). There was significant correlation between LHL15 and the increased ratio at 4min ($r=0.80$, $p<0.00005$), and at 20 min ($r=0.67$, $p<0.0005$)