

# Gd-EOB-DTPA Enhanced MR Imaging of the Liver: Correlation with Morphological Severity of Cirrhosis and Hepatic Parenchyma Enhancement at Hepatobiliary Phase

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**PURPOSE:** To clarify whether hepatic parenchymal enhancement in the hepatobiliary phase of gadolinium ethoxybenzyl diethylenetriaminepentaacetic acid (Gd-EOB-DTPA) enhanced MR imaging decreases according to the advance of the morphological severity of cirrhosis.

**METHODS AND MATERIALS:** A total of 43 patients with cirrhosis underwent Gd-EOB-DTPA enhanced MR imaging. Contrast-enhanced images were obtained before contrast injection, in the vascular phase at 3 times (25 s, 70 s and 3 min), and in the hepatobiliary phase (HP) at 3 times (10, 15 and 20 min). In the evaluation of hepatic uptake of Gd-EOB-DTPA, signal intensity (SI) of the liver in 20min HP was measured using region-of-interest (ROI) by two reviewers in consensus for relative enhancement (RE) calculation. RE of liver parenchyma was calculated from SI measurements obtained at pre-contrast images (SI<sub>pre</sub>) and post-contrast HP images (SI<sub>post</sub>) as: (SI<sub>post</sub> - SI<sub>pre</sub>) / SI<sub>pre</sub>. Regarding the grading of the morphological severity of cirrhosis, two reviewers who were unaware of clinical status assessed MR images for the changes in hepatic contour, regional morphological changes of the liver (segmental atrophy or hypertrophy), the presence of regenerating nodule, the spleen index, and the presence of varices / collaterals and ascites. Based on these findings, the severity of cirrhosis was divided into the following 4 grades; Grade 1 is characterized by normal or slightly distorted shape (spleen index  $\leq$  300, and no any sign of portal vein hypertension). Grade 2 is characterized by seriously distorted shape with some atrophies, especially in the liver segment 4 (liver fissure  $\leq$  1.5 cm, spleen index = 300-600, or 2-3 signs of portal vein hypertension). Grade 3 is characterized by regenerating nodules, badly trimmed contour, and seriously atrophied volume (fissure > 1.5 cm, spleen index > 600, and 3-4 signs of portal vein hypertension with mild ascites, smaller than 1 cm in depth). Grade 4 is characterized by more numerous regenerative nodules, indented contour, and obviously atrophied volume (fissure > 2 cm, spleen index > 1200, over 4 signs of portal vein hypertension with serious ascites, bigger than 1 cm in depth). Then, RE of the liver parenchyma at 20min HP and MR grading of the morphological severity of cirrhosis were correlated.

**RESULTS:** Regarding the morphological severity of cirrhosis, the numbers of patients with MR grade 1, 2, 3, and 4 were 8 (19%), 19 (44%), 14 (32%), and 2 (5%), respectively. There was no significant correlation between the MRI grading and the RE of liver parenchyma at 20min HP. Furthermore, the RE of liver parenchyma did not significantly correlate with each of MR finding (the changes in hepatic contour, regional morphological changes of the liver, the presence of regenerating nodule, the spleen index, and the presence of varices / collaterals and ascites).

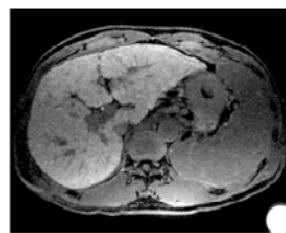
**CONCLUSION:** Hepatic parenchymal enhancement in the HP of Gd-EOB-DTPA enhanced MR imaging did not necessarily decrease according to the morphological severity of cirrhosis. This fact may suggest that the hepatic uptake of Gd-EOB-DTPA depends on the preserved hepatocytes function rather than the severity in morphologic changes in cirrhosis.



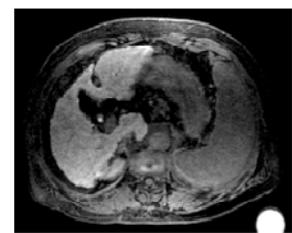
Grade I



Grade II



Grade III



Grade IV