# Signal changes in liver, spleen and bone marrow at SPIO (Ferucarbotran) enhanced MR imaging in patients with liver cirrhosis, hepatitis and normal liver

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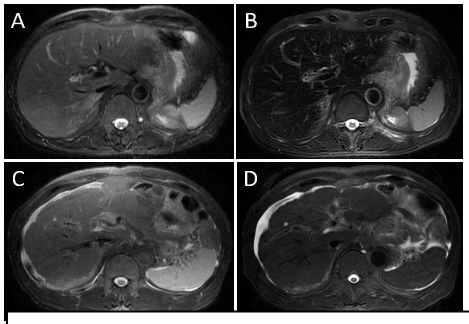
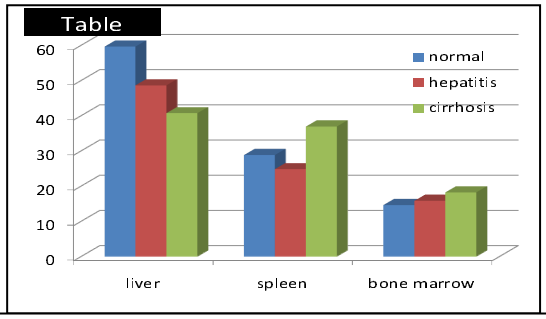
**PURPOSE:** In the previous study, it has been reported that liver and spleen uptake of superparamagnetic iron oxide (SPIO) was significantly decreased at SPIO-enhanced MR imaging in cirrhotic patients. However, we have often encountered the cases with increased uptake of SPIO in the spleen in patients with cirrhosis. The purpose of this study was to clarify whether the uptake of SPIO in the spleen increases or decreases at SPIO-enhanced MR imaging in patients with cirrhosis, hepatitis and normal liver, and to evaluate the association with liver and bone marrow uptake of SPIO.

**MATERIALS AND METHODS:** A total of 53 patients with liver cirrhosis (n=18), hepatitis (n=13), and normal liver (n=22) were examined with 1.5T MRI. Liver cirrhosis and hepatitis were confirmed by histological examination in all cases. T2-weighted images were obtained before and after using SPIO (Ferucarbotran). The signal-to-muscle ratios (SMRs) of the liver, spleen, and bone marrow were obtained to calculate the percentage difference of SMRs before and after using SPIO (SMRD%), and compared among three groups. The SMRD% of the spleen in all patients was also correlated with the size of spleen and the number of platelet as the marker of the spleen function.

**RESULTS:** The SMRD% of the liver was significantly decreased ($P<0.05$) in the following order: the normal liver group (-59.5%), the hepatitis group (-48.5%), the cirrhosis group (-40.6%), indicating decreased liver uptake of SPIO in cirrhosis. The SMRD% of the spleen was significantly increased ($P=0.02$) in the cirrhosis group (-36.8%) in comparison with the hepatitis group (-24.7%) and the normal liver group (-28.7%), indicating increased spleen uptake of SPIO in cirrhosis. There were no significant differences in the SMRD% of the bone marrow among the normal (-14.5%), hepatitis (-15.7%) and cirrhosis group (-18.1%) although the SPIO uptake was slightly increased in cirrhosis. The SMRD% of the spleen was not correlated with the spleen function.

**CONCLUSION:** Our results showed that the spleen uptake of SPIO increases in cirrhotic patients while the liver uptake of SPIO decreases in cirrhosis. This fact suggested that the spleen and bone marrow uptake of SPIO increase as the other excretion courses when the liver uptake of SPIO decreases in cirrhosis.




**Signal changes in liver, spleen and bone marrow in patients with liver cirrhosis, hepatitis and normal liver**

T2-weighted FSE images acquired before (A: normal liver, C: cirrhosis) and 10 minutes after SPIO injection (B: normal liver, D: cirrhosis). A and B show signal intensity (SI) of the liver is significantly decreased, but SI of the spleen is not so decreased. C and D show SI of both liver and spleen is moderately decreased.