

## **Iron detection and quantification in the liver**

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Although iron is an essential mineral, excessive amounts can be toxic to the human body. Iron within hepatocytes and increased total body iron in hemochromatosis is associated with an increased risk of cirrhosis and hepatocellular carcinoma (HCC) (1). Increased iron deposition has also been associated with other systemic disorders, including chronic viral hepatitis, alcoholic liver disease and non-alcoholic steatohepatitis (2). Data suggests that hepatic iron deposition may have a synergistic effect with alcohol and fat deposition in promoting the development of hepatic fibrosis and cirrhosis (3-4), and iron reduction therapy has been suggested to enhance response to interferon in chronic hepatitis C (5) and hepatitis B (6). It is therefore important to identify the presence of excessive intrahepatic iron. The reference standard for hepatic iron quantification is core liver biopsy (7), however this is relatively invasive, difficult to repeat, and limited by sampling error, particularly in chronic liver disease (8). Serum indicators of iron, for example, serum iron/ferritin concentrations and transferrin saturation, do not necessarily reflect tissue iron levels (9).

MRI represents a readily available, non-invasive means of quantifying hepatic iron MRI.

In this presentation, we will discuss the following:

1. Background on liver iron deposition, specifically we will review patient populations at risk for developing liver iron deposition. These include genetic hemochromatosis, transfusion related secondary hemosiderosis, and chronic hepatitis.
2. Histopathologic diagnosis of liver iron deposition.
3. MR sequences used for diagnosis and quantification of liver iron. These include spin echo and gradient echo methods with long echo times used to measure tissue transverse relaxation values ( $R_2$  and  $R_2^*$  respectively), which are influenced by the paramagnetic effect of iron (10-15). We will discuss semi-quantitative and quantitative MR methods.
4. Limitations and future directions of MRI for liver iron detection.

## References

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