Liver fibrosis and cirrhosis

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Fibrosis is a non-specific cicatrization process that occurs in all chronic insults of the liver. Hepatic fibrosis can evolve until an end-stage called cirrhosis, in which extensive fibrosis and nodular regeneration of the liver occurs. Currently, it is known that fibrosis is reversible and can be treated, especially before cirrhosis occurs. The diagnosis of fibrosis relies on liver biopsy. However, biopsy is invasive and there is a sampling variability related to the heterogeneity of fibrosis and the small size of the biopsies.

Various scoring systems based on serum tests have been developed to stage liver fibrosis. These biomarkers only enable differentiation between minimal and advanced fibrosis.

Anatomical MRI is limited to the detection of advanced fibrosis, even if double contrast-enhanced MRI with iron oxide particles and gadolinium chelates is used (Aguirre DA et al. 2006). Functional MRI has been proposed to stage liver fibrosis. Perfusion MRI shows the microcirculatory changes that occur in the fibrosed liver (Annet L. et al. 2003). However, the correlation between the changes of the perfusion parameters and the stage of fibrosis is only moderate. At diffusion-weighted MRI, a decrease of the apparent diffusion coefficient (ADC) is observed in liver fibrosis (Lewin M et al. 2007). This ADC decrease is mainly caused by a decrease of perfusion rather than by true extracellular diffusion changes (Annet L et al. 2007; Luciani A. et al. 2008).

Elastography is a new method that measures the visco-elastic parameters of the liver. Increased elasticity of the liver is observed in liver fibrosis. Ultrasound elastography can be used as first-line examination for staging liver fibrosis. More accurate and precise assessment of the visco-elastic parameters of the liver can be obtained with MR elastography. Currently, this appears to be the most accurate method to stage liver fibrosis (Huwart L et al. 2008). However, other factors than fibrosis can influence the mechanical properties of the liver, including inflammation, bile duct obstruction and stellate cell activation (Arena U et al. 2008).

Finally, preliminary animal studies suggest that MR elastography is useful for discriminating between steatohepatitis and simple steatosis, and that this method may detect early stages of steatohepatitis, before the occurrence of liver fibrosis (Salameh N et al. 2009).

References