

THE ROLE OF DIFFUSION-WEIGHTED AND HEPATOBILIARY-PHASE MRI IN THE CHARACTERIZATION OF FOCAL LIVER LESIONS

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Relevance. Magnetic resonance imaging (MRI) offers the highest soft-tissue contrast among imaging methods and plays a central role in characterizing liver lesions that remain indeterminate after ultrasound. In recent years, diffusion-weighted imaging (DWI) and hepatobiliary contrast agents have substantially expanded the diagnostic capabilities of liver MRI. Their correct use and interpretation, including typical pitfalls, are essential for radiologists in daily practice.

Aim. To summarize current data on the value of DWI with apparent diffusion coefficient (ADC) mapping and gadoxetic acid-enhanced MRI in the differential diagnosis of focal liver lesions.

Materials and methods. Guidelines, meta-analyses and key original studies on liver MRI indexed in PubMed and Scopus were reviewed.

Results and discussion. DWI reflects the restriction of water molecule motion and thus the cellularity of tissue. Malignant tumors usually show restricted diffusion and low ADC values, while cysts and hemangiomas show high ADC values [4]. ADC values do overlap, however. Abscesses restrict diffusion because of viscous pus, and necrotic or mucinous metastases may show high ADC. DWI should therefore always be read together with T2-weighted and dynamic contrast-enhanced images. Gadoxetic acid is taken up by functioning hepatocytes. In the hepatobiliary phase, focal nodular hyperplasia is usually iso- or hyperintense, whereas hepatocellular adenoma is most often hypointense, which helps to separate these two lesions [2]. Metastases lack hepatocytes and appear as clearly hypointense foci. According to meta-analysis data, combining DWI with gadoxetic acid-enhanced MRI provides the highest sensitivity for liver metastases, especially lesions under 1 cm [5]. A known pitfall is the "pseudo-washout" of high-flow hemangiomas in the transitional phase, which may mimic a hypervascular tumor. A very bright signal on T2-weighted images helps to avoid this

error [3]. In cirrhotic patients, the LI-RADS system standardizes reporting, using DWI restriction and hepatobiliary hypointensity as ancillary features [1].

Conclusion. DWI with ADC mapping and the hepatobiliary phase of gadoxetic acid-enhanced MRI considerably improve the detection and characterization of focal liver lesions. Their diagnostic value is greatest when they are interpreted together with conventional sequences, the dynamic phases and the clinical context.

References

1. Chernyak, V., Fowler, K. J., Kamaya, A., et al. (2018). Liver Imaging Reporting and Data System (LI-RADS) version 2018: Imaging of hepatocellular carcinoma in at-risk patients. *Radiology*, 289(3), 816–830.
2. Grazioli, L., Bondioni, M. P., Haradome, H., et al. (2012). Hepatocellular adenoma and focal nodular hyperplasia: Value of gadoxetic acid-enhanced MR imaging in differential diagnosis. *Radiology*, 262(2), 520–529.
3. Doo, K. W., Lee, C. H., Choi, J. W., et al. (2009). "Pseudo washout" sign in high-flow hepatic hemangioma on gadoxetic acid contrast-enhanced MRI mimicking hypervascular tumor. *American Journal of Roentgenology*, 193(6), W490–W496.
4. Taouli, B., & Koh, D. M. (2010). Diffusion-weighted MR imaging of the liver. *Radiology*, 254(1), 47–66.
5. Vilgrain, V., Esvan, M., Ronot, M., et al. (2016). A meta-analysis of diffusion-weighted and gadoxetic acid-enhanced MR imaging for the detection of liver metastases. *European Radiology*, 26(12), 4595–4615.