

## Evaluation of Hepatic Focal Lesions Using Diffusion-weighted MR Imaging: comparison of apparent diffusion coefficient and intravoxel incoherent motion derived parameters

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**Target audience:** audience who are interested in body DWI, intravoxel incoherent motion model

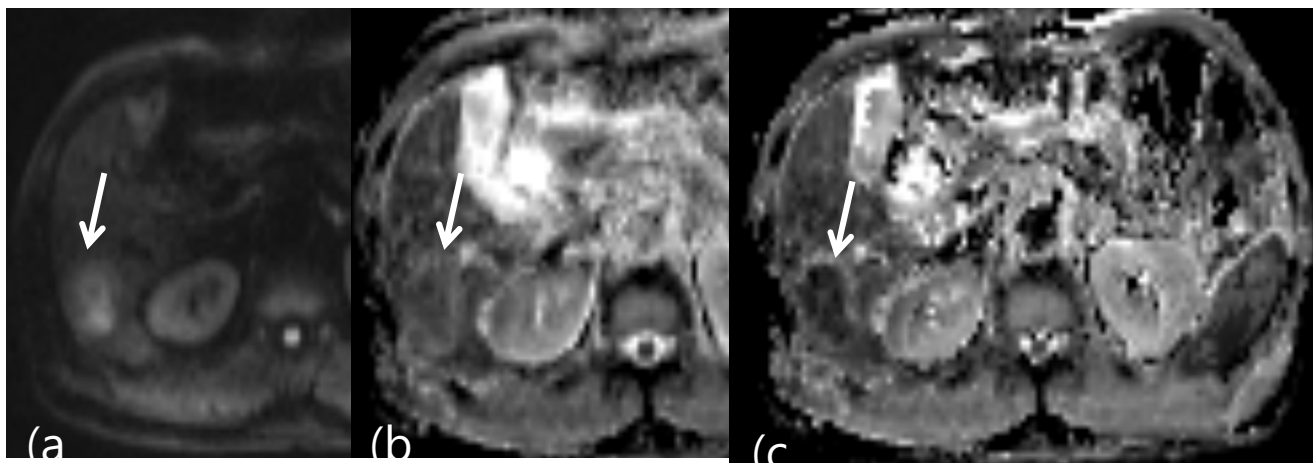
**PURPOSE:** To determine whether parameters obtained from intravoxel incoherent motion (IVIM)-diffusion-weighted imaging (DWI) using multiple b-values can improve characterization of common focal liver lesions (FLLs), compared with the apparent diffusion coefficient (ADC).

**MATERIALS AND METHODS:** Our institutional review board approved this retrospective study, and informed consent was waived. One hundred forty two patients with 169 FLLs underwent liver MR including IVIM-DWI with multiple b factors at 3.0T.  $ADC_{total}$  and IVIM-DWI-derived parameters including true diffusion ( $D_t$ ), pseudodiffusion ( $D_p$ ), and perfusion fraction ( $f$ ) were calculated for each lesion and compared using dedicated software.

**RESULTS:**  $D_t$  and  $ADC_{total}$  were significantly lower in malignancies ( $0.95\pm 0.21$ ,  $1.14\pm 0.24$ , ( $\times 10^{-3}\text{mm}^2/\text{sec}$ )) than in benign FLLs ( $1.61\pm 0.34$ ,  $1.72\pm 0.37$ , ( $\times 10^{-3}\text{mm}^2/\text{sec}$ )). In the differential diagnosis of malignancies from benign lesions,  $D_t$  (Az: 0.971) showed better diagnostic performance than  $ADC_{total}$  (Az value: 0.933) ( $p < 0.0005$ ).  $D_t$  (Az: 0.961) also showed better diagnostic performance than  $ADC_{total}$  (Az: 0.919) in differentiating hypervascular malignancies from benign hypervascular FLLs ( $p < 0.0005$ ). In addition,  $D_p$  and  $f$  were significantly higher in hypervascular FLLs ( $35.74\pm 20.08$  ( $\times 10^{-3}\text{mm}^2/\text{sec}$ ),  $28.14\pm 11.82$  (%)) than hypovascular FLLs ( $21.87\pm 13.8$  ( $\times 10^{-3}\text{mm}^2/\text{sec}$ ),  $12.2\pm 5.92$  (%)).

**DISCUSSION:** We also believe that  $D_t$  may provide more accurate information regarding the cellularity of FLLs, which would be useful in diagnosing hypervascular malignancies compared with conventional ADC; in conventional ADC maps, perfusion contribution in hypervascular malignancies leads to increasing ADC values and may lower the diagnostic performance of DWI for characterization of FLLs.

**CONCLUSION:**  $D_t$  provided better diagnostic performance than  $ADC_{total}$  in differentiating benign from malignant lesions.  $D_p$  and  $f$  were significant parameters for diagnosing hypervascular FLLs.



A 3.2cm surgically confirmed HCC in 59-year-old man. The mass (arrow) shows a high SI on DWI ( $b$  factor,  $800\text{ sec}/\text{mm}^2$ ) (a). The tumor showed slightly lower ADC value than surrounding liver parenchyma on  $ADC_{total}$  map (b), and  $D_t$  was obviously lower than liver parenchyma on  $D_t$  map (c).