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Reply: How far do we need to elaborate the quality of diffusion-weighted MR images of the liver?

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We thank Dr. Sivrioglu for the insightful comments on our previous article [1]. For Fig. 1, the influence of cardiac motion looks minimal, because the liver parenchyma was well visualized with no distortion or blackout. We certainly recognize the usefulness of cardiac gating with diffusion-weighted MR imaging (DWI) for aiming more accurate ADC measurement or clearer visualization of the left hepatic lobe, but cardiac gating increases the examination time and ADC measurement eventually would not yield crucial information for tissue characterization.

Regarding the field strength, we should have mentioned that all images were obtained on a 1.5- or 3-T imager, although there would not be significant difference in optimally obtained DWI between the two different field strengths. Regarding the inverted gray-scale display, we deemed the inversion was quite apparent to journal readers. Some radiologists prefer the display setting, because it has been often used for better lesion conspicuity with mammograms, nuclear medicine, digital subtraction angiograms, and so on.

Finally, although Dr. Sivrioglu claimed that distinguishing hemangiomas from HCC and metastases was not difficult, because there was no significant diffusion restriction of most hemangiomas, we very much disagree. Diffusion property with hemangiomas is significantly affected by the intralesional histological architecture such as congested red blood cells, thickened blood sinus walls, or degenerative changes. Differentiation of hepatic cysts from others is feasible with a *b* factor of 400 s/mm^2 or greater, but differentiation between HCC ($1.08 \pm 0.3 \times 10^{-3}$ mm^2/s), metastasis (0.99 ± 0.5), and hemangioma (1.23 ± 0.2) is difficult even by using a *b* factor as high as 800 s/mm^2 due to large overlaps of ADCs [2]. Further, ADC shows significant difference between rapidly enhancing ($2.18 \pm 0.2 \times 10^{-3}$ mm^2/s) and slowly enhancing hemangiomas (1.71 ± 0.2), suggesting that some atypically enhancing hemangiomas may well mimic malignant tumors on DWI [3].

As a bottom line, elaboration of DWI quality should come to terms with its limited and supplementary role in liver MR imaging. To compensate for the limitation of each sequence, an efficient protocol composition with multiple sequences and the use of contrast material are indispensable.

References

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