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Title: Image quality and diagnostic performance of free-breathing diffusion-weighted imaging for hepatocellular carcinoma

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1 What did this study explore?

In this study, the authors report the clinical utility of FB-DWI with modified MR parameter settings for the improvement of image quality for diagnosing HCC in patients with chronic liver disease. The free-breathing technique is generally avoided in liver DWI because it is hampered by image distortion and/or chemical shift artifacts related to the echo planar imaging technique and to motion and susceptibility artifacts. They evaluated the clinical impacts of previously reported modified MR parameter

settings to overcome these issues with FB-DWI. FB-DWI with modified MR parameter settings provided better image quality without reducing the SNR of the normal liver parenchyma and the lesion-to-nonlesion CNR. In addition, the improvement of the image quality of FB-DWI might help increase the detection of HCCs.

2 How did the authors perform all experiments?

This study was the retrospective nature of the study and approved by the Institutional Review Board of our institute. From November 2010 to September 2011, 468 consecutive patients who underwent liver MRI at our institute were enrolled.

3 How did the authors process all experimental data?

We analyzed all data by qualitative and quantitative methods. Qualitatively, the sharpness of the liver contour, the image noise and the chemical shift artifacts on each DWI with b-values of 1000 s/mm² were independently evaluated by three radiologists using 4-point scoring. We compared the image quality scores of each observer between the two DWI methods, using the Wilcoxon signed-rank test. Quantitatively, we compared the signal-to-noise ratios (SNRs) of the liver parenchyma and lesion-to-nonlesion contrast-to-noise ratios (CNRs) after measuring the signal intensity on each DWI with a b-factor of 1000 s/mm². The average SNRs and CNRs between the two DWI methods were compared by the paired t-test. The detectability of HCC on each DWI was also analyzed by three radiologists. Finally, the detectability provided by the two DWI methods was compared using McNemar's test.

4 How did the authors deal with the pre-study hypothesis?

We hypothesized that DWI with modified MR parameter settings for the improvement of image quality might result in further improvement in the detectability

of HCCs. From our results of the present study, we concluded that free-breathing diffusion-weighted imaging with modified MR parameter settings is advantageous in the diagnosis of HCCs.

5 What are the novel findings of this study?

In this study, the authors report the clinical utility of FB-DWI with modified MR parameter settings for the improvement of image quality for diagnosing HCC in patients with chronic liver disease. The free-breathing technique is generally avoided in liver DWI because it is hampered by image distortion and/or chemical shift artifacts related to the echo planar imaging technique and to motion and susceptibility artifacts. They evaluated the clinical impacts of previously reported modified MR parameter settings to overcome these issues with FB-DWI. FB-DWI with modified MR parameter settings provided better image quality without reducing the SNR of the normal liver parenchyma and the lesion-to-nonlesion CNR. In addition, the improvement of the image quality of FB-DWI might help increase the detection of HCCs.

Sincerely,

A handwritten signature in black ink, reading "Y. Tabayama". The signature is written in a cursive, flowing style with a horizontal line at the end.