

# Diffusion-weighted MR Imaging of the Liver with Sensitivity Encoding (SENSE) Technique: Improvement of Image quality and apparent diffusion coefficient (ADC) Measurement

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**Introduction:** Although apparent diffusion coefficient (ADC) measurement on diffusion weighted (DW) images is useful for characterizing focal liver lesions in the liver [1, 2], DW images has not been commonly utilized in hepatic imaging due to severe image degradation. SENSE technique may allow improvement of image quality of DW images because of shortening acquisition time, resulting in reduction of imaging artifacts [3]. We evaluated whether SENSE improved quantitative/ qualitative image quality of DW images and ADC measurement for characterizing focal liver lesions in the liver.

**Materials and Methods:** DWI was performed in 35 patients with 83 focal hepatic lesions (45 cysts, 11 hemangiomas, 21 solid malignant tumors, 6 abscesses). Single-shot echo-planar DW images of whole liver (matrix= 128x128, acquisition time= 14-21sec) were obtained using a 1.5-T MR imaging unit (Intera; Phillips Medical Systems) with following three different techniques; without SENSE (TE=131msec), with SENSE alone (TE=100msec), and with SENSE and half Fourier (HF) technique (TE=66msec). Diffusion gradients in three directions were utilized with two b values (400 and 1000 sec/mm<sup>2</sup>) for all DW imaging. Image quality was visually evaluated with 4-point scale. Signal-to-noise ratio (SNR) of DW images and ADC for all lesions were also calculated.

**Results:** The mean visual score for image quality was significantly the greatest with SENSE alone (3.18) followed by with SENSE+HF (2.78) and without SENSE (2.27) (p<.05) (Fig.1). The mean SNR was significantly the highest on DW images with SENSE+HF (30.9, 14.6) followed by with SENSE alone (18.1, 10.9) and without SENSE (8.8, 7.5) with 400 and 1000 sec/mm<sup>2</sup> of b values, respectively (p<.05). The ADC values were significantly different among all types of lesions with SENSE and/or SENSE+HF (p<.05), while the overlap was seen without SENSE (Fig. 2).

**Conclusion:** SENSE technique allowed the improvement of both image quality and ADC measurement for characterizing focal hepatic lesions on DW images.

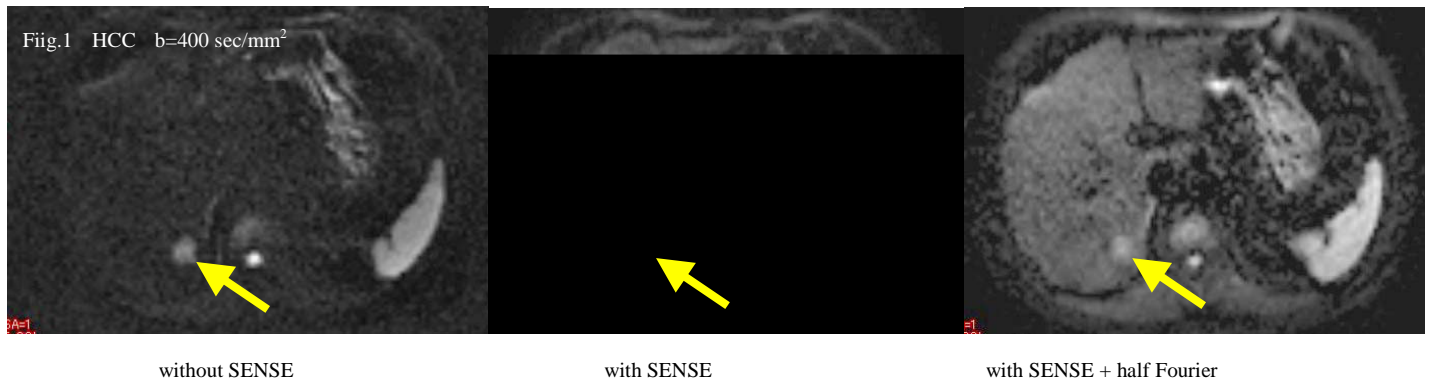
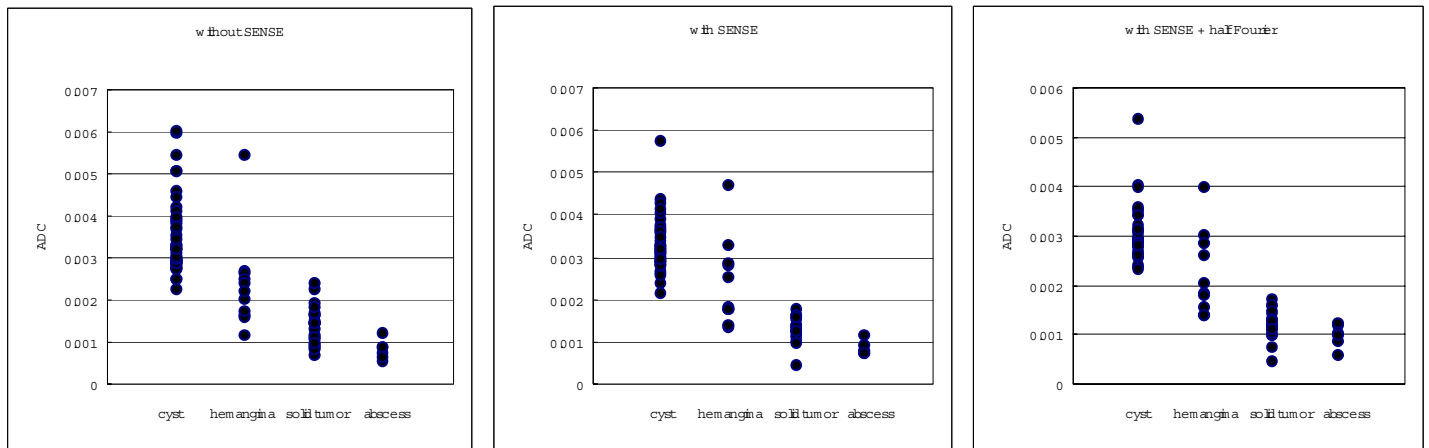


Fig. 2. Effect of SENSE technique for ADC measurement for each focal hepatic lesions (b= 400 sec/mm<sup>2</sup>)



**References:**

1. Ichikawa T, et al. AJR 1998; 170: 397-402
2. Ichikawa T, et al. Abdom Imaging 1999; 24: 456-461
3. Bammer R, et al. Magn Reson Med 2001;46: 548-554