

# Characterization of Gastric Cancer with Diffusion-Weighted MR Imaging: Prospective Study in 101 Patients

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**Purpose:** To explore the signal characters of gastric cancers on diffusion-weighted MR imaging (DWI) and compare the apparent diffusion coefficient (ADC) of different type of gastric cancers.

**Materials and methods:** MRI was performed on 101 gastric cancer patients with a 1.5T scanner and 8-channel body phase-array coil. Diffusion-weighted single-shot echo-planar sequences were performed combined with sensitivity encoding technique (Reduction factor=2). The parameters were: TR/TE, 3000ms/65ms; matrix, 128×128; slice thickness, 5mm; intersection gap, 1mm; FOV, 38cm×38cm; four signal acquired combined with segmented breath-holds. The *b* values were 0 and 1000s/mm<sup>2</sup>, and the MPG pulses were placed in 3 directions. FSPGR T1WI and SSFSE T2WI were performed to provide anatomical information. Curved lines were used to include all of cancer signals as ROIs and the ADCs were recorded.

**Results:** Ninety gastric cancers demonstrated discernibly higher signal to nearby normal gastric wall on DWI. The mean ADC of gastric cancers was  $1.20 \pm 0.31 \text{ mm}^2/\text{s} \times 10^{-3}$ . Forty-four gastric cancers displayed uniformly high signal; and 46 displayed nonuniform signal, mainly as layered (27 cases) and mixed signals (19 cases). Ten Borrmann-4 gastric cancers displayed “sandwich” sign on DWI, which appeared high signal on mucosa and serosa layers, with a low signal band mediately which indicate muscularis propria. The ADCs of diffuse-type gastric cancers were lower than that of confining-type ( $1.12 \pm 0.27 \text{ mm}^2/\text{s} \times 10^{-3}$  vs.  $1.45 \pm 0.31 \text{ mm}^2/\text{s} \times 10^{-3}$ ,  $P < 0.05$ ). Taken  $\text{ADC} = 1.27 \times 10^{-3} \text{ mm}^2/\text{s}$  as cut-off points on ROC curves, the sensitivity was 71.0% and the specificity was 81.0% for the judgment of diffuse-type gastric cancers.

**Conclusion:** Gastric cancers display various signal characters on DWI, of which Borrmann-4 gastric cancers demonstrate distinctive sandwich sign. ADCs have statistical significances between different types of gastric cancers.

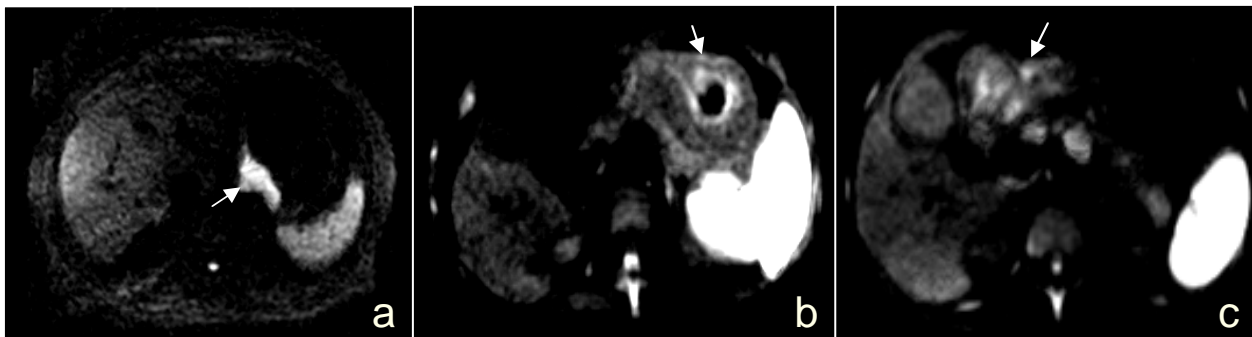


Fig.1 Signal characters of gastric cancer on DWI. a, uniformly high signal. b, layered signal. c, mixed signal.

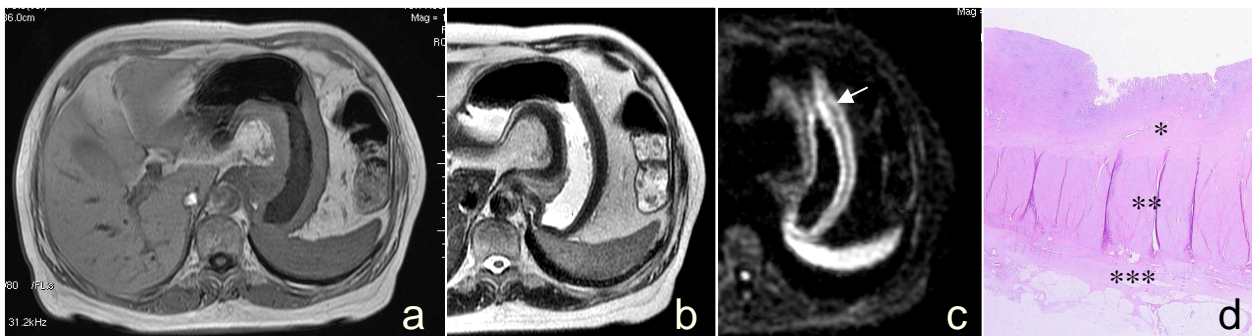


Fig.2 Borrmann-4 gastric cancer. a, FSPGR T1WI displayed uniform signal. b, SSFSE T2WI displayed two-layer signal. c, DWI displayed three-layer signal. d, pathological section showed the three layers on DWI were mucosa/submucosa, muscularis propria, and subserosa/serosa, respectively.