

Diffusion-Weighted Imaging of the Body as a Screening Tool for Colorectal Carcinomas

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Purpose: Diffusion-weighted imaging (DWI) of the body has recently been reported to be highly sensitive for detection of malignancies. Hence, we have investigated if DWI is applicable as a screening tool.

Materials and Methods: The study included 21 patients with colorectal carcinoma, who underwent both DWI of the body and contrast enhanced CT imaging. The DWI was performed without holding of the breath. The equipment and parameters used for DWI were a Signa L x 1.5T (GE Medical Systems), a single-shot SE-EPI with IR, body coil, TR / TE / TI = 8000 - 10000 / 78 – 81 / 70, matrix = 128 x 64, FOV = 40 mm, slice thickness / gap = 4 / 0, b-factor = 1000, NEX = 6, location = upper abdomen and pelvis (two consecutive locations). For CT, an Aquilion 16 (Toshiba Medical Systems) was used, with a slice thickness of 5mm, injection of 2 ml / kg of contrast material in 30 seconds, and scanning started 90 seconds after the start of the injection. 3D-reconstruction was applied to the DWI results, and two radiologists were asked to evaluate the 3D-reconstructed DWI images and the axial CT images of the upper abdomen and pelvis. When the colorectal lesion was easily detected on the image, the radiologists assigned this image to be excellent (2 points); when the lesion was detected but was not clearly apparent, the image was assigned as good (1 point); and when the lesion could not be detected, the image was assigned as poor (0 point). The mean scores for DWI and CT were calculated and compared.

Results: All patients underwent resection of the tumor and were pathologically diagnosed with colorectal carcinoma. The lesions were located in the rectum in 11 patients, in the sigmoid colon in 3, in the ascending colon in 6 and in the cecum in 1. Pathologically, the mean of the maximum diameter of the lesions were 40.5 mm (range: 20 – 80 mm). The mean score for DWI (1.6) was significantly higher than that for CT (1.0), and the relative sensitivities of DWI and CT were 90% (19 / 21) and 62% (13 / 21), respectively. The two lesions which were not detectable by DWI were also undetectable with CT, and the diameters of these lesions were 25 mm or less. The lesions that were missed only by CT were 25 to 55 mm in diameter, with 6 located in the rectum and 1 in the ascending colon.

Conclusion: DWI of the body is highly sensitive for detection of colorectal carcinomas and may be applicable for colorectal screening in patients with a positive fecal occult blood test.

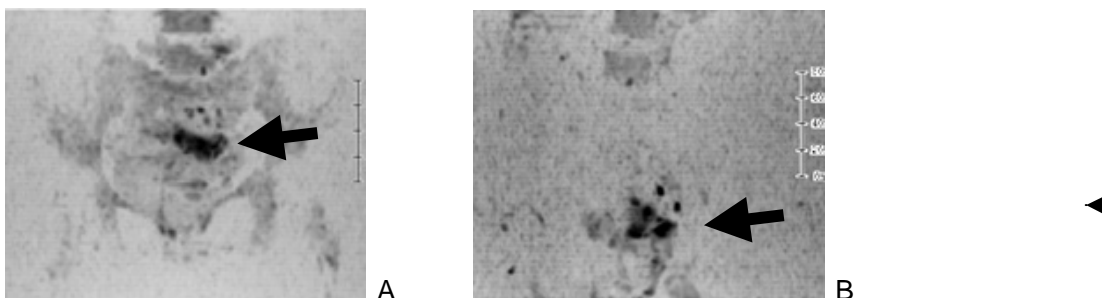


Figure. 3D-reconstructed DWI. Carcinoma of sigmoid colon (A) and rectum (B) were clearly demonstrated.