COMPARISON IN FUNCTIONAL AND METABOLIC MR IMAGING FINDINGS BETWEEN TARGETED AND NON-TARGETED UNRESECTABLE HEPATIC TUMORS TREATED WITH TACE

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Objective: To compare functional (tumor enhancement and ADC value) and metabolic (tumor Choline concentration) MR imaging findings in patients with unresectable hepatic tumors treated with TACE.

Materials and Methods: MR Imaging studies were obtained before and after a single TACE treatment in 19 patients (mean age, 60 years) with primary (11/19) or metastatic (8/19) liver lesions. Patients were imaged using a 1.5-T MR scanner and a phased array torso coil. Imaging protocol included BH diffusion-weighted echoplanar images (matrix, 128 x 128; thickness, 8 mm; gap, 2 mm; B value, 750; TR, 2100; TE, 60), single voxel MR spectroscopy (TR, 1500; TE 144; 3 cm voxel size), and BH unenhanced and contrast-enhanced T1-weighted 3D fat-suppressed GRE (matrix, 192 x 160; thickness, 4-6 mm; TE 1.2; flip angle, 15) in the arterial (20 sec) and portal venous (70 sec) phases. Images were evaluated by consensus of 2 radiologists. Tumor size, enhancement, spectral analysis and ADC values were recorded before and after treatment.

Results: A single tumor was included in each patient. Eight patients (3 males, 5 females, mean age 60 years) had targeted tumors. All targeted tumors had complete loss of the Choline peak on MR spectroscopy. These patients also had a significant increase in tumor ADC value (22%, p=0.004), without change in ADC value of the liver or spleen as demonstrated by paired t-test. There was also a significant decrease in tumor arterial and venous enhancement (43%, p=0.005 and 40%, p=0.002; respectively). Eleven patients (8 males, 3 females; mean age 61 years) had untargeted tumors, with no evidence of tumor response, and stable Choline peak before and after therapy. These patents had no change in ADC value of the tumor, liver or spleen (p = 0.32, 0.46 and 0.34, respectively) after TACE. There was also no change in arterial and venous enhancement. Tumor size in both groups with targeted and untargeted tumors remained unchanged after therapy (p=0.51).

Conclusion: Successful tumor embolization in targeted tumors with loss of Choline peak had a significant increase in ADC values and a significant reduction in tumor enhancement. Untargeted tumors had a stable Choline concentration, as well as stable tumor enhancement and ADC changes. These functional findings precede tumor regression in size, and may be utilized to detect early therapeutic response.

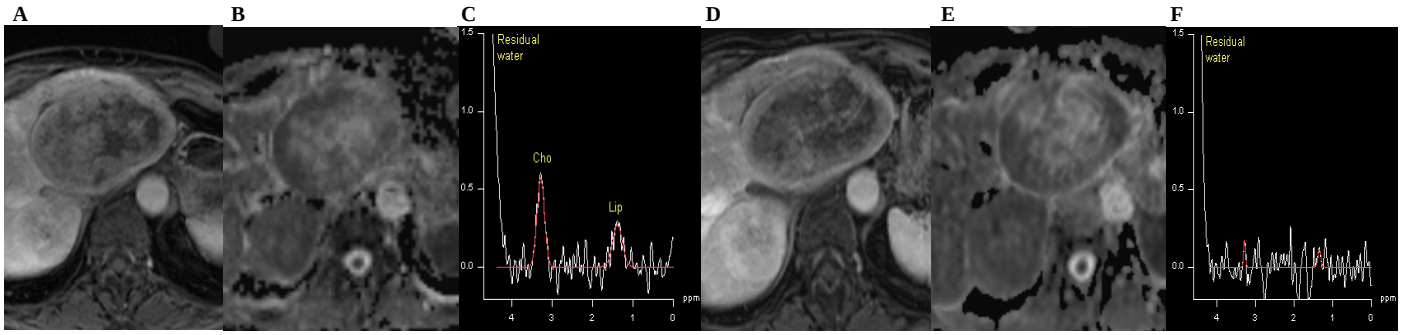

Figure 1. Changes in enhancement, ADC value and Choline peak after TACE in a patient with HCC. **(A)** Gadolinium-enhanced image (repetition time/echo time, 5.1 msec/1.2 msec) shows a large left lobe mass, with 50-75% enhancement. **(B)** ADC value generated from the DWI was 1.73 x 10^{-3} mm^2/sec. **(C)** Spectral analysis shows a large Choline peak. **(D)** Gadolinium-enhanced image (repetition time/echo time, 5.1/1.2 msec) after TACE shows significant decrease (now less than 25%) in enhancement. Notice that the lesion did not decrease in size. **(E)** The ADC value after TACE was 2.14 x 10^{-3}, indicating increasing cellular necrosis. (F) Spectral analysis of the lesion after TACE shows complete loss of Choline peak indicating metabolic atrophy.