ROLE OF FUNCTIONAL MR IMAGING IS ASSESSING TREATMENT RESPONSE TO TRANSARTERIAL CHEMOEMBOLIZATION (TACE) IN PATIENTS WITH HEPATIC METASTATSES.

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Objective: To assess the utility of functional MR imaging in assessing treatment after TACE in patients with unresectable hepatic metastases.

Materials and Methods: MR Imaging studies before and after selective TACE on 32 patients (mean age, 59 years) with hepatic metastatic were evaluated. The primary cancer was breast, soft tissue sarcoma and melanoma in 14, 10 and 8 patients, respectively. Patients were imaged using a 1.5-T MR scanner and a phased array torso coil. Imaging protocol included T2-weighted FSE images (matrix, 256 x 256; thickness, 8 mm; gap, 2 mm; TR, 5000; TE 100), BH diffusion-weighted echoplanar images (matrix, 128 x 128; thickness, 8 mm; gap, 2 mm; B value, 500; TR, 5000-6500; TE, 110), 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 (60 sec) phases. Images were evaluated by consensus of 2 radiologists. Tumor size, arterial and venous enhancement, and ADC values were recorded before and after treatment.

Results: A total of 78 lesions (mean size 5.2 cm) were evaluated. The average number of treatments per patient was 2 (range 1-3) and the average duration between pre- and postprocedural MR imaging was 58 days. Arterial and venous enhancement decreased after TACE by 36% ($p<0.0001$) and 49% ($p<0.0001$), respectively. Mean tumor ADC increased after TACE by 30% ($p<0.0001$), whereas the ADC remained unchanged in non-tumorous liver and spleen (Figure 1). Although mean tumor size decreased to 4.4 cm (16%; $p=0.002$) after TACE, it did not meet RECIST for complete response (disappearance of all measurable disease). Based on these results, all patients in our cohort would have been considered non-responders to TACE using size criteria. These trends were true for each of the primary tumor subtypes.

Conclusion: Hepatic metastases that were treated with TACE demonstrated decrease in arterial and venous enhancement due to interruption of the tumor blood supply. In addition, increase in tumor ADC indicated increasing cellular necrosis after therapy. These functional MR imaging features may be used as surrogate markers for assessing response to therapy before morphological changes in tumor size occur.

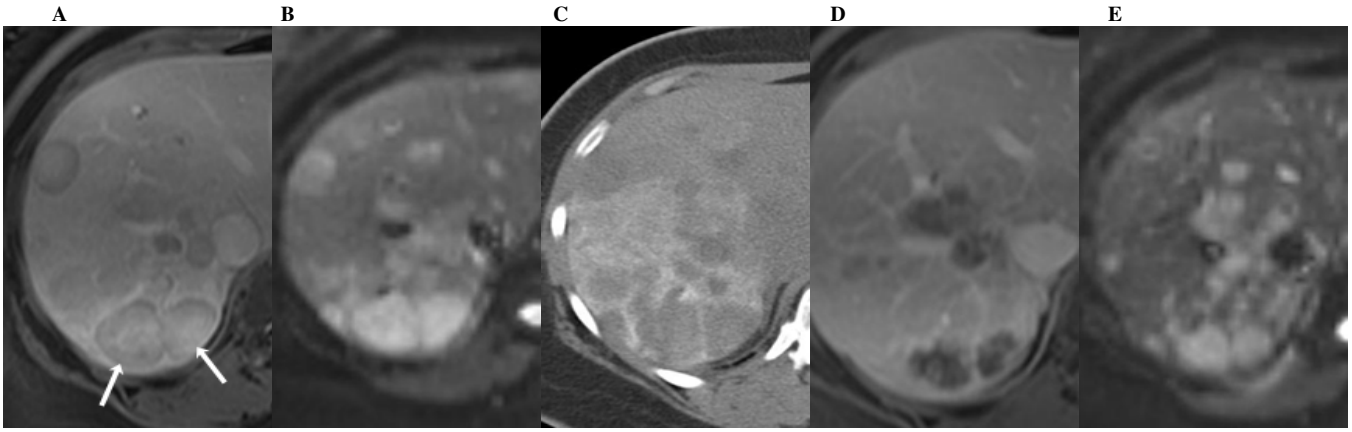

Figure 1. Changes in enhancement and ADC value after TACE. **(A)** Gadolinium-enhanced image (repetition time/echo time, 5.1 msec/1.2 msec) shows multiple liver metastases, with near 100% enhancement (arrows). **(B)** DWI (repetition time/echo time, 6,500/110 msec) shows multiple hyperintense masses. The ADC values were 1.29×10^{-3} and 1.33×10^{-3} mm^2/sec for the 2 lesions in the right lobe. **(C)** Unenhanced CT following TACE shows minimal iodized oil within the lesions. **(D)** Gadolinium-enhanced image (repetition time/echo time, 5.1/1.2 msec) after TACE shows significant decrease (75%) in enhancement. Notice that the lesions have only minimally decreased in size. **(E)** DWI (repetition time/echo time, 6,500/110 msec) after TACE shows continued increase in signal intensity of the lesions (arrows). The ADC values were 1.81×10^{-3} and 1.83×10^{-3} mm^2/sec for the 2 lesions in the right lobe, confirming increasing cellular necrosis.