

SERIAL CELLULAR CHANGES AFTER TACE AS DETECTED BY PERFUSION AND DIFFUSION-WEIGHTED MR IMAGING IN PATIENTS WITH UNRESECTABLE HCC

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Objective: To assess serial changes in perfusion and diffusion MR imaging values early (1 month) after TACE in patients with unresectable HCC.

Materials and Methods: MR Imaging studies were obtained before and immediately (within 24 hours) after TACE in 24 patients (mean age, 60 years) with HCC. Serial MR imaging was subsequently performed at 1, 2, 3 and 4 weeks after therapy. 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, enhancement, and ADC values were recorded before and sequentially after treatment.

Results: A single tumor was included in each patient, and mean tumor size was 7.0 cm. No change in tumor size was detected at 4 weeks after therapy (p=0.372). Reduction of tumor enhancement at 24 hours, 1, 2, 3, and 4 weeks was 37%, 47%, 41%, 37%, and 34%, respectively. Paired T-test was statistically significant at all 5 time points (p=0.0001, 0.0004, 0.0004, 0.003, and 0.002, respectively). Increase in tumor ADC value at 24 hours, 1, 2, 3, and 4 weeks was 6%, 29%, 24%, 20%, and 7%, respectively. Paired T-test was statistically significant at 1, 2 and 3 weeks (p=0.01, 0.005, 0.06, respectively). However, no change in ADC was detected at 24 hours and 4 weeks after therapy (p=0.22 and 0.29, respectively).

Conclusion: Successful tumor embolization resulted in significant reduction in tumor enhancement, occurring within 24 hours after TACE, and persisting up to 4 weeks after treatment. Destruction of the cellular membranes and tumor necrosis resulted in a more delayed increase in ADC values, which appeared one week after therapy, persisted through the second and third weeks, and became less apparent at 4 weeks. These temporal findings precede tumor regression in size, and indicate that perfusion and diffusion MRI can detect early therapeutic response.

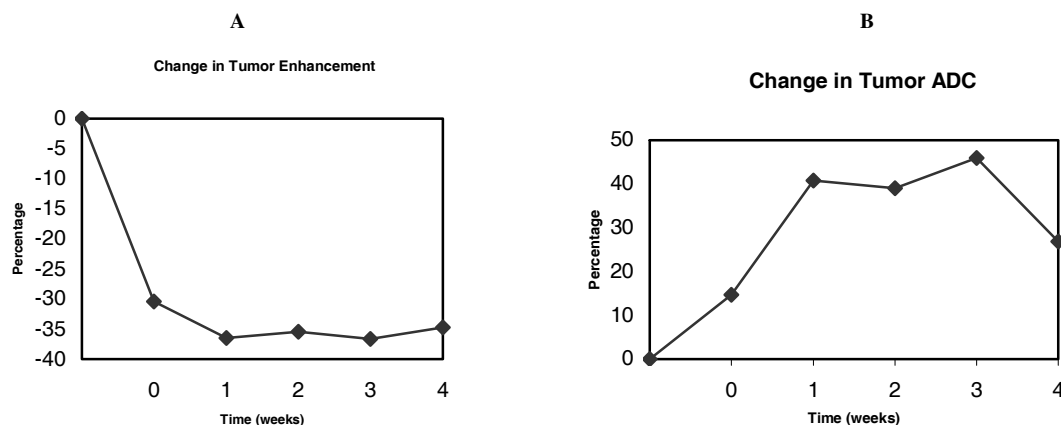


Figure 1. Representative 56 y.o male patient with changes in enhancement and ADC after TACE. (A) Percent decrease in tumor enhancement (perfusion MRI) after TACE compared to baseline. Time 0 is 24 hours after TACE. (B) Percent increase in tumor ADC (diffusion MRI) value after TACE compared to baseline. Time 0 is 24 hours after TACE.