

Intra-Procedural C-Arm Dual-Phase Cone-Beam CT Imaging to Predict Response of Hepatocellular Carcinoma During Drug-Eluting Bead Transcatheter Arterial Chemoembolization

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Purpose: To investigate whether intra-procedural dual-phase cone-beam computed tomography (DPCBCT) imaging can predict response of hepatocellular carcinoma (HCC) during drug-eluting bead transarterial chemoembolization (DEB-TACE).

Materials and Methods: Forty-seven targeted lesions in 27 patients (15 males; age, 61.9 ± 10.7 years; range, 30-80 years) with unresectable HCC treated with DEB-TACE in a hybrid C-arm CBCT/interventional radiology prototype suite were retrospectively analyzed. MRI studies were performed 1 month before and after TACE therapy. Intra-procedural CBCT imaging was carried out prior to and immediately following TACE. Pre- and post-procedural tumor enhancement (TE) at both first and second phases was assessed by two experienced radiologists blind to MRI findings. Tumor response (TR) was recorded according to European Association for the Study of the Liver criteria (EASL). The percent change in TE was calculated and compared to MRI values.

Results: A favorable (complete or partial) EASL TR was achieved in 74.5 and 76.6% of lesions at 1 month on arterial and venous phases, respectively. Paired T-tests comparing pre- and post-TACE TE showed statistically significant average reduction in TE for both modalities by phase and by lesion ($p < 0.01$). Linear correlation between decrease in TE post-TACE for MR and CBCT for both phases as measured by Pearson correlation coefficient was excellent (0.80). A statistically significant

negative relationship between post-TACE CBCT TE and favorable TR on MR was found: for every 1 unit increment of post-TACE CBCT TE, the probability of favorable TR on MR went down by 5% for first phase (95% CI; range, 0.91-0.99; $p=0.027$) and by 4% for second phase (95% CI; range, 0.93-1.00; $p=0.034$).

Conclusions: Intra-procedural DPCBCT technology can be used at the time of DEB-TACE to predict 1-month anatomical HCC response.