AbstractID: 11452 Title: Computer-aided diagnostic scheme for detection of hepatocellular carcinoma in contrast-enhanced hepatic CT: Preliminary results

Purpose: Hepatocellular carcinoma (HCC) is one of the most common primary malignant tumors of the liver. We developed a computer-aided diagnostic (CAD) scheme for detection of HCC in arterial-phase hepatic CT in order to assist radiologists in their HCC detection.

Materials and Methods: Our database consists of isotropic arterial-phase CT scans of 14 patients acquired with a multi-detector-row CT system with a 64 channel detector scanner, which includes 16 radiologist-determined HCCs that were confirmed pathologically. Lesion sizes ranged 6-50 mm, with a mean of 22.6 mm. We developed a CAD scheme consisting of 1) liver segmentation, using fast-marching rough-segmentation followed by geodesic-active-contour fine-segmentation coupled with a level-set algorithm, 2) detection of HCC candidates from the segmented liver, based on a watershed segmentation algorithm, 3) calculation of both 2D and 3D morphologic-, intensity- and texture-based features of the detected candidates, and 4) classification of HCC candidates by means of linear discriminant analysis (LDA) of the calculated features, with a stepwise feature selection method based on the Wilks' lambda and the F value. The performance of the CAD scheme was evaluated by free-response receiver-operating-characteristic analysis.

Results: With the candidate selection segment of the detection scheme, we achieved 100% sensitivity with 15.1 false positives per patient. Of the 254 calculated features, the stepwise LDA selected 45 "useful" features for candidate characterization. Using these 45 features, we decreased the false positive rate to 6.1 false positives per patient, with no loss in sensitivity.

Conclusion: In contrast-enhanced arterial-phase hepatic CT, our CAD scheme achieved a 100% sensitivity in detection of HCCs with 6.1 false positives per patient. This detection scheme could assist radiologists in detecting HCCs; thus, it would potentially improve radiologists' detection sensitivity for HCCs.