AbstractID: 10770 Title: Evaluation of a generalized contrast enhancement protocol for 4D-CT imaging of liver tumors

Purpose: Intravenous contrast is needed to enhance tumor visibility in the liver. Unfortunately, conventional diagnostic CT protocols cannot be used due to the extended acquisition time required. We present results of a generalized contrast enhancement protocol for 4D-CT imaging of liver tumors.

Method and Materials: 92 patients (metastases: 39, cholangiocarcinomas: 44 hepatocellular carcinomas: 9) were enrolled in the study. All 4D-CT images were acquired on a GE Discovery ST PET/CT scanner in cine mode. 150 mL of intravenous contrast was delivered at a rate 5 mL/s. Liver metastases and cholangiocarcinomas were imaged in the portal venous phase with a delay of 45 seconds while hepatocellular carcinomas were imaged in the delayed phase at 270 seconds. A region of interest inside and outside of the tumor was created, and the average CT numbers were analyzed.

Results: The protocol produced enhancement of greater than 35 CT numbers in 72% of patients with liver metastases and cholangiocarcinomas and 44% in patients with hepatocellular carcinomas. The image quality of the metastases and cholangiocarcinomas patients was improved considerably (vessels and the tumor borders could be more easily distinguished) but modest improvement was detected in hepatocellular carcinomas. Tumor contrast enhancement was not directly correlated with body surface area, but rather with the inherent contrast of the tumor. Average absolute delay time of tumor imaging was 70 seconds for cholangiocarcinomas (σ=15 s) and 66 seconds for metastases (σ=13 s). In this range the degree of enhancement in metastases was more sensitive to the absolute delay time compared to the cholangiocarcinomas and for longer delays less contrast enhancement was observed.

Conclusion: The protocol works well for the majority of patients with cholangiocarcinomas and liver metastases. For tumors located well below the dome of the liver, a reduction in delay time may enhance tumor visibility.