AbstractID: 10895 Title: Radiation dose reduction in CT guided cryoablation using HYPR-LR

Purpose: Patients under CT guided interventional procedures usually receive high radiation dose as multiple scans are performed. The purpose of this study is to investigate potential of dose reduction for CT-guided renal tumor cryoablation using a newly developed image reconstruction technique: Local HYPR Reconstruction (HYPR-LR).

Method and Materials: Three patients, each with a renal tumor, underwent percutaneous cryoablation with CT monitoring. Original full dose projection data sets were saved and exported to a personal computer. Noise was inserted into the projection data to simulate low dose scans (50% of the original dose) using a novel noise insertion tool developed by our lab. Low dose images at different freezing time were then reconstructed from the simulated low dose projections using commercial reconstruction algorithm. HYPR-LR was conducted using the average low dose images as a composite image. Image quality, focusing on target (ice ball) visibility and image noise, was compared among full dose images (FD), low dose images (LD) and low dose HYPR-LR images.

Results:
Low dose images reconstructed with HYPR-LR demonstrate similar image quality as the full dose scan images and superior to the low dose images reconstructed with commercial software. Image noise measured at three set of images were: 51.3 (LD), 38.3 (FD), and 31.8 HU (HYPR-LR). The growing ice ball can be better visualized in the HYPR-LR image series compared to the low dose images due to improved image quality.

Conclusion:
HYPR-LR has been demonstrated to be useful for dose reduction in renal tumor cryoablation with CT monitoring. Our study shows that at least a factor of 2 dose reduction is achievable by reducing the tube mAs by 50%. Clinically, this translates into a factor of 2 reduction in radiation risk (deterministic or stochastic) for the increasing numbers of patients undergoing CT-guided tumor cryoablation.