AbstractID: 9673 Title: Evaluation of Noise Reduction Methods on Very Low Dose CT Renal Perfusion Imaging

Purpose: To quantify the impact of dose reduction on the image quality of time-resolved renal perfusion CT images and to compare the performance of several noise reduction algorithms on very low-dose perfusion images. **Method and Materials:** In this study, series of renal perfusion CT images were generated using a porcine model. The 3-minute full-dose scans were performed at 80 kVp and 160 mAs with the animal in a baseline physiological state. Dose-reduced scans were performed 10 minutes later on the same animal and same scanner (Siemens Definition) at 80 kVp with 32 mAs or 16 mAs, respectively, with the animal still at baseline conditions. Several traditional image-based noise-reduction algorithms (low-pass, median, and sigma-filter) and the recently introduced local highly constrained back projection (HYPR-LR) were applied to the low-dose images. Signal-to-noise ratios (SNR) and time-density curves were obtained on the full-dose, original low-dose, and various de-noised low-dose images. **Results:** Examination of SNR and time-density curves from de-noised low-dose images shows that the SNR and time-density curves were similar or improved at both $1/5^{th}$ and $1/10^{th}$ dose levels. **Conclusion:** The time-density curves of low-dose renal perfusion CT images, which provide physiological quantification of organ perfusion and function, are not compromised by use of image-based noise-reduction algorithms. While traditional image-based filters provided greater noise reduction, a decrease in spatial resolution was evident. With a different noise reduction mechanism from spatial filters, HYPR processed images maintained spatial resolution, making them more suitable for applications such as time-resolved CT angiography. **Conflict of Interest:** CHM and ANP: Research grants from Siemens Medical Solutions.