AbstractID: 9244 Title: Dose Reduction in CT Using a Novel Fourier-Based Iterative Reconstruction Method

Purpose: A novel Fourier-based iterative acquisition and reconstruction method, termed Equally-Sloped Tomography (EST), has been developed for reconstructing an image from an undersampled number of projections. We review this method and present the first series of comparative experiments and simulations quantifying the image quality and the dose reduction through this method. **Method and Materials:** Using the MOBY whole body mouse phantom and the Zubal whole body human phantom, CT simulations of EST vs. filtered back projection (FBP) and iterative algebraic methods were performed as function of number of projections and flux. The reconstruction image quality was quantified using SNR and CNR of contoured organs, modulation transfer function (MTF), and Fourier ring correlation (FRC). The simulations were experimentally verified using a cone-beam x-ray microCT scanner. A microfluidic resolution phantom and a MTF phantom were manufactured to quantify the experimental image quality. Using the microCT phantoms, the resolution, SNR, and CNR were tabulated as a function of flux and number of projections. Using this data, a dose reduction factor was calculated by determining the flux and number of projections that resulted in an equivalent SNR and resolution for EST relative to conventional reconstructions. **Results:** For the same number of projections and flux, all simulated and experimental reconstructions via EST resulted in better or equivalent SNR, FRC, and resolution relative to FBP. The dose reduction factor based on the SNR and resolution equivalence criteria was 35-45% for reconstructions with the number of projections above the Nyquist criteria and 40-50% dose reduction when the number of projections is undersampled. **Conclusion:** The results indicate that EST provides an effective method for dose reduction in CT and warrants further investigation. **Conflict of Interest:** Research sponsored by TomoSoft Technologies corporation.