

AbstractID: 11662 Title: Development of Low Dose X-ray Phase Contrast CT using a Novel Projection Retrieval Reconstruction Algorithm

**Purpose:** In contrast to attenuation based x-ray imaging, phase contrast x-ray imaging, produces radically enhanced images of soft tissues through imaging of the phase shift cross-section, which is 100-1000 larger than the corresponding x-ray attenuation cross-section. One obstacle in the development of phase contrast x-ray CT (PCXCT) for medical imaging is the radiation dose imparted to the patient due to large number of projections and flux required for an adequate image quality. Here we develop and quantify a methodology for low dose PCXCT using novel iterative Fourier based projection retrieval reconstruction algorithm that aims to solve the reconstruction problem from a limited number of projections through the use physical and mathematical constraints as well as the oversampling method. **Materials and Methods:** An image quality phantom, containing multiple contrast visibility and resolution inserts, was imaged at the European Synchrotron Radiation Facility (ESRF). Conventional reconstructions were produced via Filtered Back Projection (FBP) using the full set of 200 projections. Reconstructions using the projection retrieval algorithm were made with 50-60% fewer projections. The image quality of the reconstructions were quantitatively compared using SNR, CNR, and resolution. **Results:** With 60% fewer projections, the methodology matched the resolution of the FBP reconstruction, exceeded the SNR of the FBP by factor of 1.8, and exceeded the CNR of the FBP by factor of 1.7. No geometric deformations were observed due to the undersampling of the number of projections. **Conclusions:** The results indicate that the developed algorithm can reproduce reconstructions of same or superior quality using 50-60% fewer projections and hence radiation dose than FBP. **Conflict of Interest:** A portion of this research was sponsored by TomoSoft Technologies, LLC.