AbstractID: 8450 Title: Performance Evaluation of Three Algorithms for Metal Artifact Reduction in CT Imaging

Purpose: To provide a reference for clinical applications by investigating the performance of three metal artifact reduction (MAR) methods for CT imaging. **Method and Materials:** The expectation maximization (EM) algorithm, algebraic reconstruction technique (ART), and a MAR method based on filtered back projection (FBP) were tested with Shepp-Logan phantom in noise free and additive Gaussian noisy environments. A small disk of metal was added to the phantom to simulate the metal effect, and the projection data were obtained by parallel beam projection. In each projection data set, there were 180 views and 367channels. Noise was simulated by adding Gaussian noise ($\mu = 0.5, \sigma = 0.5$) to the projection data.

Computational experiments were performed to demonstrate and compare effectiveness of artifact reduction. Essential characteristics such as reconstruction accuracy, convergence, computational costs, have been evaluated. In addition, the robustness of MAR algorithms to variations of the threshold for detecting metal region in implementation was also investigated. **Results:** Simulations with Shepp-Logan phantom in noise free and additive Gaussian noisy environments show that all of these methods can provide high-quality reconstruction images. In comparison, EM obtains the most accurate reconstruction image and shows highest robustness to parameter variation. In addition, EM converges faster than ART. As for computational costs, FBP removes metal artifacts most efficiently. **Conclusions:** Simulations have shown that all of three methods can finish artifact reduction task effectively. In comparison, EM can provide most accurate reconstruction image and FBP remove the effect of metal most efficiently. The studies presented herein would provide a reference for clinical use. Future work involves comparison of MAR techniques based on real raw data.