AbstractID: 8966 Title: Image reconstruction from sparse data in breast CT

Purpose: Because breast CT acquires projection data at a large number of views and involves no breast compression, the radiation dose involved may be significant. In this study, we investigate image reconstruction from projections acquired at a small number of views in breast CT, thus potentially reducing the radiation dose to the patient.

Method and Materials: A clinical trial has been carried out at UC-Davis using their breast CT scanner. Circular cone beam projections are acquired at 500 views over 360 degrees for each patient. Based on compressed sensing approach, we have developed an algorithm for image reconstruction from sparse data, which involves the minimization of the total variation (TV) of the underlying image function subject to the data condition. We have applied the TV-based algorithm to reconstruct breast images from patient data acquired in the clinical trial studies. The reconstructed images are compared to those reconstructed by the FDK algorithm.

Results: Image reconstruction was performed using both TV and FDK algorithms for patient data sets acquired only at 50 views and 100 views. The results suggest that images obtained with the former are superior to that obtained with the latter. Images were also reconstructed by the FDK algorithm from the full data sets containing 500 views, which are regarded as the gold standard in this study. A comparison shows that the TV reconstructions from sparse data can reveal most of the details that are observed in the FDK reconstruction from full data.

Conclusion: An initial comparative study suggests that the TV reconstructions from sparse data can reveal most of the details of a patient breast. A potentially significant implication is that the TV-based algorithm may lead to a reduction of radiation dose in breast CT imaging.

Conflict of Interest (only if applicable): N/A