Purpose:
Current breast-CT prototypes acquire data at a large number of views because analytical algorithms such as FDK are used. Constrained-total-variation-minimization-based algorithms, however, have the potential to reconstruct images from data collected at a substantially lower number of views, thus further reducing imaging dose to patients. In this study, we investigate and compare reconstructions from data collected in breast-CT patient studies with both FDK and constrained-TV-minimization-based algorithms.

Methods:
In breast CT, a small imaging dose has to been distributed among a large number of views required by analytic algorithms, which results in a low signal-to-noise ratio (SNR) level of the data. Reconstruction from low-SNR data is challenging for analytic and, in particular, iterative algorithms such as constrained-TV-minimization-based algorithms, which often leads to artifacts such as blocky appearance or salt-and-pepper artifact. We have developed a constrained-TV-minimization algorithm (ASD-POCS) and carefully implemented for reconstruction from low-SNR breast-CT data. In this work, we investigate image reconstruction using ASD-POCS algorithm from breast-CT patient data acquired in a clinical trial carried out at UC-Davis. For each study, data were acquired at 500 views over 360 degrees with a circular-cone-beam configuration. We also created data sets that are subsets of the 500-view data. Images were reconstructed from the 500-view and created data sets, using both FDK and ASD-POCS algorithms.

Results:
The results of our study suggest that the ASD-POCS algorithm may yield improved images, depending on data quantitative and evaluation metrics, over the FDK algorithm. For example, the contrast-to-noise ratios in ASD-POCS images are generally higher than that in FDK images. For images with calcifications, this means possibly higher calcifications contrast.

Conclusions:
Our preliminary results suggest that the proposed technique can potentially improve image quality of breast CT. The proposed algorithm can further reduce total imaging dose in breast CT by reducing the number of views.