AbstractID: 1910 Title: Improving Lung Scan Temporal Resolution Using Tidal-Volume Sorted Sinograms from 4DCT

Characterizing breathing motion will be important for determining the effect of such motion on IMRT dose distribution delivery. To help characterize breathing motion we have developed a method for reconstructing retrospectively gated CT images. The method uses the raw "sinogram" data and a gating signal derived from spirometry measurements that are recorded continuously during the CT scans. We use a 16 detector-row scanner (Siemens Sensation 16), using 12-slice ciné mode with 15 scans acquired at each couch position. Each scan requires 0.5 seconds for 360-degree data acquisition and 0.25 seconds between scans. We have developed a MATLAB computer program that creates a "composite" sinogram from the 15 sinograms acquired at a given couch position at a user-selected tidal volume. Precise information about the timing of the CT acquisition is available from data structures within the raw data and the spirometry data is synchronized to the CT during acquisition. The user specifies a tidal volume range for reconstruction based on the spirometry record. The program then selects a complete 360-degree sinogram dataset from the 15 scans acquired within the specified tidal volume limits. If a complete set of data is unavailable the user can broaden the range. After a complete composite sinogram is constructed the CT image for the central detector slice at this couch position is reconstructed using a fan-beam filtered backprojection algorithm implemented in the C programming language. The resulting image has reduced motion artifacts and the process provides the flexibility of selecting the tidal volume range for reconstruction.