AbstractID: 3573 Title: Video-Surface-Guided Respiratory Motion Correction for 3D Static CT Images

Purpose:
Three-dimensional (3D) static CT images of structures in the thorax and abdomen constantly suffer from artifacts caused by periodic respiratory motion. This study presents a novel method to correct respiratory motion for 3D CT images by correlating CT images with dynamic body surface models in which physiologic motion of body surface is recorded with the aid of a 3D video imaging system.

Method and Materials:
We introduce a new dynamic CT imaging technique that utilizes a commercially available high-speed 3D camera system to gather magnitude and frequency information of respiration cycle by acquiring the motion of body surface. A dynamic body surface model is built to record 3D surface geometry and texture information at different phases of respiration cycle. Retrospective gating technique is then adopted to correlate or register CT images with the dynamic body surface model. Multiple skin markers shown on CT and video surface images are used for verification of the dynamic model.

Results:
In this study, motion artifacts were remarkable reduced and accurate 4D CT datasets were generated for the further use by planning systems.

Conclusion:
Quantifying internal anatomy motion as a function of respiration cycle is important in conformal radiotherapy, especially for lung and breast tumors. Compared to conventional 3D CT, four-dimensional CT (4D CT) techniques present overwhelming advantage on imaging objects undergoing periodic motion. The feasibility of 4D CT techniques based on a 3D video imaging system has been demonstrated in this work. Correlating these images with the dynamic body surface models reduced respiratory motion artifacts for 3D CT images.

Conflict of Interest (only if applicable): Partially supported by the camera company.