

AbstractID: 5426 Title: Patient setup based on lung tumor mass for gated radiotherapy

Purpose: To develop a lung cancer patient setup technique for gated radiotherapy based on the direct image registration of lung tumor mass.

Method and Materials: We develop a tumor mass based patient setup technique for gated radiotherapy that matches the lung tumor of the radiographic image to the DRR image. For each patient, AP and lateral DRRs at exhale are generated from the corresponding 4DCT data with the projected GTV outer contour. During patient setup, AP and lateral radiographs are acquired at exhale using an on-board x-ray imaging system. First, an image registration algorithm is applied to match the regions of interest around the tumor mass in both radiographic and DRR image. Second, an interactive registration procedure, which uses a computer mouse to drag the GTV contour in the radiographic image to its correct position, is applied to verify and/or correct the automatic registration results.

Results: We tested the various existing image registration algorithms and found that maximizing mutual information performs best for lung tumor registrations. Excellent matches can generally be made, and if nuanced adjustments are needed for a particular patient, they can be accomplished through interactive registration.

Conclusion: Automatic registration of lung tumor mass in radiographic image to DRR is feasible for most of patients to provide precise patient setup based on tumor mass, rather than skin markers or bony structures. Interactive registration is needed to provide human verification and correction.

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