

We have studied the motion of targets within lung-cancer patients to assess the feasibility of using image directed radiation therapy (IDRT) as delivered by either a Cyberknife or a dynamic multileaf collimator (DMLC). During the simulation of patients with lung tumors, ~90 second AP and lateral fluoroscopic videos were recorded on a high resolution video recorder. The videos were then digitized. Respiration curves were extracted from the digital videos. Relying on the respiration curve and their correlation merits, frames at the same position of the respiration cycle were detected and averaged. A set of consecutive frames representing a template of a single respiration cycle, with improved SNR, were obtained for each view. Coupling the frames between the AP and lateral views at the same position of the respiration yielded the synchronized AP and lateral videos. The range of target motion was determined by drawing contours around the target on the frames at the extremes of the respiration cycle. Correlation of target positions with observable fiducial markers will provide the necessary information for delivering IDRT. More than ten patients' videos were collected and analyzed with the present approach. Target motions larger than 2 cm in the lung region were detected. Further work will focus on collecting additional patients' data to establish a statistical motion model and on the completion of the target tracking system.