AbstractID: 1255 Title: Dosimetric Evaluations and Analyses of A Moving Target Volume Treated with Respiratory-Gated Intensity Modulated Radiotherapy

The purpose of this study is to investigate the effects of target motion resulting from respiration on the accuracy of absolute doses, intensity profiles, and dose distributions delivered by respiratory-gated intensity modulated radiotherapy. We developed a moving phantom simulating a typical target motion due to a patient's normal breathing cycle. A commercial respiratory gating system was used to automatically control the beam-on timing of a linear accelerator based on the motion of an external marker placed on the phantom. The treatment window was set so that during the beam-on period the phantom moved from 1.5 to 27 mm. We exposed films under several conditions: stationary phantom, moving phantom with gated control, and moving phantom without gated control of static or dynamic IMRT. The absolute doses and intensity profiles of a single IMRT field measured under the stationary condition served as a reference for comparison to the other conditions. Our results showed significant dose variations between the static and moving conditions without gated control using both static and dynamic IMRT. However, the absolute doses and intensity profiles delivered by a single static or dynamic IMRT field to a moving target with gating had no significant differences from those of a stationary target. Furthermore, no significant differences in the isodose distributions of the moving or stationary target were found in a phantom treated with multiple gated step-and-shoot or sliding window IMRT fields.

Research supported by Varian Medical Systems and GE Medical Systems