

AbstractID: 1616 Title: The Dosimetric Impact of Daily CT Alignment on Prostate Cancer Radiotherapy

By using daily CT image alignment, we can minimize positional uncertainties caused by both setup errors and internal organ motion. Then the planning margin may be reduced while maintaining tumor dose coverage, resulting in a corresponding dose reduction in nearby critical structures. In this study we will examine the dosimetric impact of daily CT alignment on prostate cancer treatments. Fifteen prostate patients received three CT scans per week during their treatments. Three representative prostate patients were selected (73 scans total). Two IMRT plans were designed for each patient. The first plan (1cmIMRT) used clinical margins and was imported and aligned on subsequent scans using skin marks. The second plan (3mmIMRT) used reduced margins and was imported and aligned on subsequent scans using the daily prostate center-of-volume. The 1cmIMRT method failed to maintain the prostate 75.6Gy-coverage for one patient (100% coverage predicted versus 88.8% coverage average). The 3mmIMRT method increased the average prostate 75.6Gy-coverage and decreased the variation in daily dose in all patients so that the average coverage was within 4% of prediction. The 3mmIMRT method decreased the average seminal vesicles 75.6Gy-coverage in two patients (95.3% to 88.1%, 96.7% to 92.4%) while increasing the daily dose variations, demonstrating that an additional seminal vesicles alignment may be needed. As expected the rectal and bladder average doses and daily dose variations decreased with the 3mmIMRT plans. However, the average rectal and bladder doses could not be predicted from the planning CT, demonstrating the necessity of daily CT imaging for accurate dose information.