

Purpose: The purpose of this study was to evaluate the volume changes of target and critical organs using cone-beam CT (CB-CT) and to investigate their effects on the organs and doses for prostate IMRT cases. Previously the feasibility of CB-CT based treatment planning was demonstrated by researchers (Lee et al., 2006; S. Yoo et al., 2008, Int. J. Rad. Onc. Biol. Phys.)

Method and Materials: Ten prostate IMRT patients had daily on-board imaging and weekly kV CB-CT using a Trilogy system for treatment position verification. The latest CB-CT data were imported into Eclipse treatment planning system and used for drawing CB-CT based contours for prostate, rectum, and bladder. The volume of the organs in CB-CT were measured and compared to the organ volumes from the initial CT images. Organ contours were exported to the primary IMRT plan and the plan was re-run using CB-CT based volumes with the same field parameters. The volume and mean dose changes were measured.

Results: The average interval between the first CT and latest CB-CT was 29 days. The mean volume changes of the prostate, rectum and bladder were -8.3%, 10.8%, and -5.6%, respectively between the first CT and latest CB-CT for 10 prostate IMRT cases. The dose coverage ratios of CB-CT based volumes to primary volumes were 99.9%, 111.7% and 100.6% for prostate, rectum and bladder, respectively.

Conclusion: The prostate volume got decreased about 8% (n=10) after a month based on kV CB-CT and the dose coverage remained the same. However, in the average approximately 10% increase in rectal volume and dose were observed. The greater mean volume was measured for bladder with CB-CT, however, the mean dose was almost equal to the primary plan. Therefore, based on the observation, updated volumes with CB-CT can be used for improving the rectal dose as needed.