

Purpose: For an IGRT prostate cancer treatment using CT simulation and Cone-beam CT (CBCT), bone-based automated matching and target-volume-based manual matching are compared with each other to comprehend their characteristics and any major difference.

Methods: 20 patients of prostate or prostate/seminal vesicle treatment were selected. All of the patients were treated with XVI-guided VMAT or IMRT. Each patient has his cone-beam CT images in the database. The patient's daily shift information of both manual matching and automated matching was taken from XVI. Then, five patients' data that have the largest deviation between two methods were chosen, and were analyzed by Pinnacle3: the shift information from the manual and automated matching was applied to the plan, and then prostate as GTV and critical organs of the rectum and bladder were contoured. Based on the composite plan, the dose on each organ was computed for both manual and automated matching.

Results: PTV from each treatment plan with margin of 5 mm all around except for 3-mm margin in posterior direction turned out to be wide enough to cover the whole prostate for both manual and automated matching. After aligning each patient's skin-marking and laser, IGRT suggests 0.5 to 2 cm shifts from the aligned position in posterior/anterior and superior/inferior directions. In spite of the full coverage of GTV, the rectum and bladder received doses significantly different from the two matching approaches.

Conclusion: The current margin for PTV seems to work properly so that both GTVs from manual matching and automated matching are fully covered. For IGRT, skin-marking alignment becomes less important based on the matching data. Importantly, we found bone-based matching and target-based matching could result considerable difference in V90 of the rectum and bladder.