

only. 251 (91%) used conventional fractionation and 21 (7.6%) used hypofractionation. Cisplatin was the most common ($n = 168$; 61%) preferred chemotherapy agent. In non-cisplatin candidates, most preferred 5-Fluorouracil/Mitomycin C ($n = 89$; 32%) or carboplatin ($n = 89$; 32%). 127 (46%) used adjuvant RT (aRT). Indications included gross residual disease ($n = 118$; 93%), positive margins ($n = 117$; 92%), node involvement ($n = 81$; 64%), and pT3/4 ($n = 58$; 46%).

Conclusion: Great variability exists in how US radiation oncologists treat MIBC patients. Nearly half of respondents recommend aRT, which is not supported by clinical evidence. In non-cisplatin candidates, one third offer carboplatin, which is discouraged by NCCN guidelines. It is disappointing to see that only 30% of patients may be offered the balanced discussion of cystectomy and bladder preservation treatment. Participation in a multi-D clinic for MIBC patients, in which only 20% of respondents participate, may improve counseling regarding both approaches. Further patient and clinician education is important to ensure that bladder preservation is discussed with all patients as a NCCN-endorsed alternative to cystectomy. Further research and education are needed to determine the best RT techniques, appropriate concurrent chemotherapy, and the role of aRT.

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A Matched Comparison of Patients Treated With Standard Dose External Beam Radiation Versus Dose-Escalated, Adaptive, Image Guided External Beam Radiation for Favorable Intermediate-Risk Prostate Cancer

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Purpose/Objective(s): Although radiation therapy (RT) dose escalation has been shown to be associated with improved biochemical control, clinical benefits of improvements in RT techniques have been more difficult to demonstrate. This analysis was conducted to investigate the clinical benefits of image guidance and dose escalation in the treatment of patients with favorable, intermediate risk prostate cancer.

Materials/Methods: A total of 781 patients with favorable intermediate risk prostate cancer were treated with standard dose (mean = 67.2 Gy) external beam radiation therapy (EBRT $n = 260$) or image-guided, dose-escalated (mean = 75.9 Gy), adaptive radiation therapy (ART) at a single institution between the years 1988 and 2011. "Favorable" intermediate risk disease was defined as harboring no more than a single intermediate risk feature per NCCN criteria (clinical stage T2b, PSA 10-20, or Gleason score 7). A multivariable linear regression model was used to generate the propensity score match with a 1:1 ratio. Variables used for matching included age at diagnosis, clinical T stage, Gleason score, pre-treatment PSA and whether or not the patient received androgen suppression therapy (AST). A total of 240 patients were matched. Clinical outcomes were measured from the date of radiation therapy completion and included overall survival (OS), biochemical control (BC), local control (LC), free of distant metastasis (FDM), cause-specific survival (CSS), and disease free survival (DFS).

Results: For the matched cohort, median follow-up was 9.2 years for EBRT patients (range 3.1-20.9 years) and 7.2 for those treated with ART (3.1-16.2). Mean ages were 73 and 72 years for EBRT and ART, respectively. Mean dose for the EBRT cohort was 67.2 Gy vs. 75.9 Gy for the ART patients ($P < 0.001$). At 10 years post-treatment, ART patients had significantly ($P < 0.05$) better BC (91.6% vs. 68.7%), LC (88.8% vs. 61.9%), DFS (74.8% vs. 34%), and OS (78.9% vs. 48.3%) compared to EBRT. Differences in CSS (100% vs. 94.6%, $P = 0.08$) and FDM (99% vs. 95.1%, $P = 0.14$) did not reach statistical significance.

Conclusion: RT dose escalation and image guidance are associated with superior clinical disease outcomes compared to historically standard treatment techniques. This analysis contributes to a growing body of evidence underscoring the importance of local disease control in early stage prostate cancer.

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Image Guided Radiation Therapy Treatment Using Daily Versus Weekly Cone Beam Computed Tomography for Intensity Modulated Radiation Therapy of Prostate Cancer

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Purpose/Objective(s): To compare the daily CBCT (DCBCT) with weekly CBCT (WCBCT) as a verification method for delivery of the treatment by intensity modulated radiation therapy (IMRT), for patients with prostate cancer.

Materials/Methods: We retrospectively reviewed the readings of cone beam CT (CBCT) images of 19 patients with prostate cancer treated with IMRT from Jan 2012 to Feb 2015. After pooling all images obtained from the 19 patients, these were classified into three categories: systematic (no previous image), daily (≤ 3 days interval from previous image) and weekly CBCT (> 3 days interval from the previous image). For each image, data collected included the size of the shifts measured in the 6 directions: medial-lateral (ML), superior-inferior (SI) and anterior-posterior (AP). In all 6 directions' measurements, the presence of a significant shift was assumed for an absolute value > 0.2 cm and the proportion of significant shifts was compared between DCBCT and WCBCT. In addition, means (SD) of absolute shifts were compared between DCBCT and WCBCT. Furthermore, we assessed the fitness of our planning target volume (PTV) that uses a 1 cm margin all around the prostate, except 0.6 cm in the posterior direction. Therefore, we compared the proportion of readings within the PTV in DCBCT versus WCBCT images. Statistical analysis was performed using statistical analysis software. Independent t-test was used to compare means between and Pearson's Chi-square to compare proportions. The null hypothesis was rejected for a P value < 0.05 .

Results: A total of 450 images were pooled and analyzed: 19 (4.2%) systematic, 370 (82.2%) daily and 61 (13.6%) weekly. Comparisons between DCBCT versus WCBCT images showed a mean (SD) absolute shift of 0.32 (0.30) versus 0.30 (0.26) cm in the ML direction ($P = 0.676$), 0.35 (0.31) versus 0.33 (0.29) cm in the SI direction ($P = 0.774$); and 0.25 (0.25) versus 0.21 (0.22) cm in the AP direction ($P = 0.296$), respectively. Similarly, there were no major differences between DCBCT and WCBCT regarding the proportion of significant shifts, except in the ML direction where we observed more (30.3%) left shifts in daily versus weekly (13.1%) images and more (37.7%) right shifts in weekly than in daily (20.3%) CBCT, ($P = 0.002$). Analysis of fitness of PTV showed no less than 95% of the readings within the margin, in all 6 directions, with no significant difference between daily and weekly images.

Conclusion: Daily CBCT did not show superior accuracy as compared to weekly CBCT, in patients with prostate cancer treated with IMRT. Consequently, weekly CBCT appears to be a safe alternative, especially recommended in departments with over-request. As per the direction, the use of a 6-to-10 mm margin in the PTV showed no less than 95% of the readings within the margin, in all 6 directions, with no significant difference between daily and weekly images.

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Fiducial Marker-Based 2-Dimensional kV Orthogonal Imaging Is More Reliable for Adjusting Interfractional Shifts Than Soft Tissue-Based Cone Beam Computed Tomography for Image Guided IMRT for Prostate Cancer

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