Patterns of lymph node positivity on $^{11}$C-acetate PET imaging in correlation to the RTOG pelvic radiation field for prostate cancer.

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Abstract

PURPOSE: $^{11}$C-acetate positron emission tomography (PET) imaging allows for the detection of occult metastatic disease that may otherwise go undetected with standard imaging for prostate cancer (PCa). The aim of this study was to evaluate lymph node coverage of the standard Radiation Therapy Oncology Group (RTOG) whole pelvic radiation therapy (WPRT) field in patients found to have node-positive PCa determined by $^{11}$C-acetate PET imaging.

METHODS AND MATERIALS: A retrospective analysis was conducted on 125 PCa patients who underwent $^{11}$C-acetate PET scans at our institution between 2007 and 2014. Patients were included if they had evidence of nodal disease without distant metastatic cancer. Individual lymph nodes were characterized by location, size, and relationship to the RTOG WPRT field.

RESULTS: A total of 55 $^{11}$C-acetate PET scans (from 54 men) met criteria for inclusion in the study. Median age at diagnosis was 61 years. Median prostate-specific antigen values at diagnosis and at the time of the scan were 9.2 and 8.1 ng/mL, respectively. A total of 159 positive lymph nodes were identified, 78% of which were smaller than 1 cm. The most frequently involved lymphatic regions were the external iliacs (38.4%), para-aortics (19.5%), and common iliacs (16.3%). Additionally, 10.1% of positive nodes were identified as nodes of Cloquet. Of the positive nodes, 51.6% were determined to reside outside of the radiation field and, of those, the most common sites were para-aortic (36.9%), proximal common iliac (17.8%), distal external iliac (17.8%), and nodes of Cloquet (17.8%).

CONCLUSIONS: Based on $^{11}$C-acetate PET imaging in patients with PCa, the standard RTOG WPRT field may miss more than one-half of all positive lymph nodes. Clinicians should be aware of the potential for insufficient nodal coverage when using the standard RTOG WPRT field in patients with node-positive PCa. $^{11}$C-acetate PET imaging may be useful in defining target volumes for these patients.

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