Localized Prostate Cancer Detection with (18)F FACBC PET/CT: Comparison with MR Imaging and Histopathologic Analysis.

Turkbey B¹, Mena E, Shih J, Pinto PA, Merino MJ, Lindenberg ML, Bernardo M, McKinney YL, Adler S, Owenius R, Choyke PL, Kurdziel KA.

Abstract

Purpose To characterize uptake of 1-amino-3-fluorine 18-fluorocyclobutane-1-carboxylic acid ((18)F FACBC) in patients with localized prostate cancer, benign prostatic hyperplasia (BPH), and normal prostate tissue and to evaluate its potential utility in delineation of intraprostatic cancers in histopathologically confirmed localized prostate cancer in comparison with magnetic resonance (MR) imaging. Materials and Methods Institutional review board approval and written informed consent were obtained for this HIPAA-compliant prospective study. Twenty-one men underwent dynamic and static abdominopelvic (18)F FACBC combined positron emission tomography (PET) and computed tomography (CT) and multiparametric (MP) 3-T endorectal MR imaging before robotic-assisted prostatectomy. PET/CT and MR images were coregistered by using pelvic bones as fiducial markers; this was followed by manual adjustments. Whole-mount histopathologic specimens were sliced with an MR-based patient-specific mold. (18)F FACBC PET standardized uptake values (SUVs) were compared with those at MR imaging and histopathologic analysis for lesion- and sector-based (20 sectors per patient) analysis. Positive and negative predictive values for each modality were estimated by using generalized estimating equations with logit link function and working independence correlation structure. Results (18)F FACBC tumor uptake was rapid but reversible. It peaked 3.6 minutes after injection and reached a relative plateau at 15-20 minutes (SUVmax[15-20min]). Mean prostate tumor SUVmax(15-20min) was significantly higher than that of the normal prostate (4.5 ± 0.5 vs 2.7 ± 0.5) (P < .001); however, it was not significantly different from that of BPH (4.3 ± 0.6) (P = .27). Sector-based comparison with histopathologic analysis, including all tumors, revealed sensitivity and specificity of 67% and 66%, respectively, for (18)F FACBC PET/CT and 73% and 79%, respectively, for T2-weighted MR imaging. (18)F FACBC PET/CT and MP MR imaging were used to localize dominant tumors (sensitivity of 90% for both). Combined (18)F FACBC and MR imaging yielded positive predictive value of 82% for tumor localization, which was higher than that with either modality alone (P < .001). Conclusion (18)F FACBC PET/CT shows higher uptake in intraprostatic tumor foci than in normal prostate tissue; however, (18)F FACBC uptake in tumors is similar to that in BPH nodules. Thus, it is not specific for prostate cancer. Nevertheless, combined (18)F FACBC PET/CT and T2-weighted MR imaging enable more accurate localization of prostate cancer lesions than either modality alone. © RSNA, 2013 Online
supplemental material is available for this article.

PMID: 24475804 [PubMed - in process]

LinkOut - more resources