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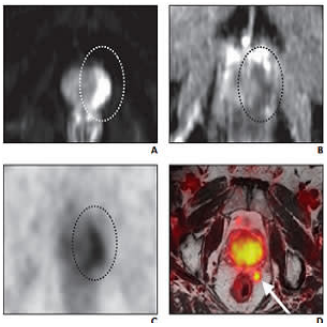
RSNA 2019: PSMA-based PET Radiotracers Transforming Care in Prostate Cancer



A large number of radiotracers are currently being evaluated for prostate-specific membrane antigen (PSMA) PET, which is becoming a central tool in the staging of prostate cancer, according to a review published in the American Journal of Roentgenology.

Staging in various clinical contexts of prostate cancer, such as the preoperative setting and biochemical recurrence, has been limited owing to the low detection sensitivity of bone scintigraphy, magnetic resonance imaging (MRI), and computed tomography (CT). Numerous radiotracers targeting biologic processes that are upregulated in prostate cancer have been evaluated, including 11C-choline, 18F-fluorocholine, 11C-acetate, and 18F-fluciclovine.

However, as the AJR article notes, it is the development of small-molecule radiotracers targeting PSMA that is leading to a change in the care of patients with prostate cancer. These small molecules have considerable benefit over previous antibody approaches because they rapidly accumulate in PSMA-expressing tissue and are cleared quickly from the blood pool. This family of compounds includes SPECT and PET agents such as 99mTc-trofolastat (99mTcMIP-1404; MIP = Molecular Insight Pharmaceuticals), N-[N-[(S)-1,3-dicarboxypropyl]carbamoyl]-4-18F-fluorobenzyl-l-cysteine (18F-DCFBC), 2-(3-{1-carboxy-5[(6-[18F]fluoro-pyridine-3-carbonyl)-amino]-pentyl}-ureido)-pentanedioic acid (18F-DCFPyL), 68Ga-PSMA-11, and 18F-PSMA-1007.

"PSMA PET is a highly promising modality for the staging of prostate cancer because of its higher detection rate compared with that of conventional imaging," the article says.

It should be noted, however, that PSMA is not specific to prostate cancer and readers need to be aware of a number of false-positive findings. "When interpreting images, radiologists characterising PSMA-avid lesions need to consider clinical context, previous imaging studies, and characteristics at conventional imaging," the article explains. "In particular, ureteral activity must be considered in the evaluation of pelvic uptake, because urine activity can be misinterpreted as nodal disease."

There is limited literature on the role of PSMA PET for active surveillance and secondary screening. Previously reported studies have focused on patients with known prostate cancer undergoing preoperative staging before prostatectomy. Nonetheless, the article points out, PSMA PET may be beneficial because it is not expressed in benign prostatic hypertrophy, and it may have additive value for primary prostate cancer detection when combined with multiparametric MRI.

As many as 30 patients of patients treated with definitive therapy have a recurrence, according to the article. Most of the literature on the use of PSMA PET for biochemical recurrence describes 68Ga-PSMA-11 PET. The benefit in detection sensitivity is seen primarily in patients with low prostate-specific antigen (PSA) levels, in whom, many believe, the disease may be curable with external beam radiation therapy targeting the prostate bed or with stereotactic body radiation therapy to a limited number of sites of more distant disease.

Both PET/CT and PET/MRI offer benefits with PSMA radiotracers. In particular, dynamic contrast-enhanced MRI is beneficial in detecting local recurrences, and the ability to combine multiparametric MRI with PSMA PET is likely helpful for detection of local recurrence, the article explains.

As PSMA PET findings frequently lead to changes in care management, the article says, it is imperative that subsequent treatment changes be evaluated to show improved outcomes.

PSMA PET also has potential applications, including patient selection for PSMA-based radioligand therapy and evaluation of treatment response, the article adds.

Source: American Journal of Roentgenology
Image Credit: American Journal of Roentgenology

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