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Editorial

Imaging Role in Urology

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Screening and current imaging modalities have led to a decrease in advanced disease and cancer-related mortality, these modalities have limitations in terms of sensitivity and specificity, resulting in missing clinically significant cancers and over detection of clinically insignificant cancers [1]. Prostate Cancer-Specific Positron Emission Tomography (pcPET) has been shown to detect sites of disease recurrence at serum Prostate-Specific Antigen (PSA) levels that are lower than those levels detected by conventional imaging. Review of the literature generally favors PSMA-based agents for the detection of recurrence as a function of low PSA levels. A review of carbon 11/fludeoxyglucose 18 (F-18) choline and F-18 fluciclovine data commonly demonstrated lower detection rates for each respective PSA cohort. Sensitive pcPET imaging has provided new insight into the early patterns of disease spread [2]. The incidental detection of localized renal masses has been rising steadily, but a significant proportion of these tumors are benign or indolent and, in most cases, do not require treatment. At the present time, a majority of patients with an incidentally detected renal tumor undergo treatment for the presumption of cancer, leading to a significant number of unnecessary surgical interventions that can result in complications including loss of renal function [3]. Prostate cancer is a prevalent malignancy often presenting without early symptoms. Advanced imaging technologies have revolutionized its diagnosis and management. Advanced imaging techniques, including mpMRI, microUS, and PSMAPET/CT, have significantly improved the accuracy of prostate cancer diagnosis, staging, and management. These technologies enable more precise targeting of suspicious lesions during biopsy and therapy planning [4]. The 2021 Advanced Prostate Cancer Consensus Conference (APCCC) addressed some of the issues and guidelines. The voting results from a panel of experts in advanced prostate cancer can help clinicians and patients to navigate controversial areas of management for which high-level evidence is scant. However, diagnostic and treatment decisions should always be individualized according to patient characteristics, such as the extent and location of disease, prior treatment(s), comorbidities, patient preferences, and treatment recommendations, and should also incorporate current and emerging clinical evidence and logistic and economic constraints.

Enrollment in clinical trials should be strongly encouraged. Importantly, APCCC 2021 once again identified salient questions that merit evaluation in specifically designed trials [5]. Tremendous technological advancements in prostate radiotherapy have decreased treatment toxicity and improved clinical outcomes for men with prostate cancer. Developments in prostate imaging, image-guided targeted biopsy, next-generation gene expression profiling, and targeted molecular therapies now provide information to stratify patients and select treatments based on tumor biology. Image-guided targeted biopsy improves detection of clinically significant cases of prostate cancer and provides important information about the biological behavior of intraprostatic lesions which can further guide treatment decisions [6]. Accurate detection of metastatic prostate cancer has traditionally been accomplished with a combination of computed tomography, magnetic resonance imaging, and bone scan [7]. Radiomics allows the extraction of quantitative features from imaging, as imaging biomarkers of disease. Using unsupervised hierarchical clustering, patients were grouped on the basis of similar radiomic patterns, whose association with Gleason Grade Group (GGG), Extracapsular Extension (ECE), and Nodal Involvement (pN) was tested. Signatures composed by IFs from T2w-images and Apparent Diffusion Coefficient (ADC) maps were tested for the prediction of GGG, ECE, and pN. T2w radiomic pattern was associated with pN, ECE, and GGG ($p = 0.027$, 0.05, 0.03) and ADC radiomic pattern was associated with GGG ($p = 0.004$). The best performance was reached by the signature combing IFs from multiparametric images (0.88, 0.89, and 0.84 accuracy for GGG, pN, and ECE). A reliable multiparametric MRI radiomic signature was extracted, potentially able to predict PCa aggressiveness, to be further validated on an independent sample [8]. Bladder cancer is the sixth most common cancer in the United States, and one of the most expensive in terms of cancer care. The overwhelming majority are urothelial carcinomas, more often non-muscle invasive rather than muscle-invasive is usually diagnosed after workup for hematuria. While the workup for gross hematuria remains CT urography and cystoscopy, the workup for microscopic hematuria was recently updated in 2020 by the

American Urologic Association with a more risk-based approach. Bladder cancer is confirmed and staged by transurethral resection of bladder tumor. One of the main goals in staging is determining the presence or absence of muscle invasion by tumor which has wide implications in regards to management and prognosis. CT urography is the main imaging technique in the workup of bladder cancer. There is growing interest in advanced imaging techniques such as multiparametric MRIfor local staging, as well as standardized imaging and reporting system with the recently created Vesicle Imaging Reporting and Data System (VI-RADS). Therapies for bladder cancer are rapidly evolving with immune checkpoint inhibitors, Particularly Programmed Death Ligand 1 (PD-L1) and Programmed Cell Death Protein 1 (PD-1) inhibitors, as well as another class of immunotherapy called an antibody-drug conjugate which consists of a cytotoxic drug conjugated to monoclonal antibodies against a specific target. Finally, Current imaging modalities have strengths but also weaknesses, such as the lack of ability to diagnose micrometastases, to differentiate significant from nonsignificant cancer, and to diagnose advanced disease.

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