

## Radiation therapy for prostate cancer

It is a privilege to present this special issue of *Translational Andrology and Urology (TAU)*, which focuses on radiation therapy for prostate cancer. Many thanks to the dedicated and generous authors whose contributions made this issue possible.

The intended purpose of this issue is to raise awareness of radiation therapy and to provide current perspectives on some of its most important topics related to prostate cancer. Whether you are the most seasoned senior clinician or junior trainee, this issue is a resource for reviewing the literature, formulating practice patterns and educating patients. And, translational scientists and clinical researchers who are considering the future of prostate radiation therapy have a concise collective of ideas and opinion from well-recognized and leading experts in the field.

The incidence of prostate cancer is commonest in parts of the world that practice prostate specific antigen (PSA) screening. As a consequence, the majority of prostate cancer is clinically localized, non-metastatic, and ideally suited to a local therapy. In-tact prostate cancer may be treated definitively with radiation therapy using either an external approach, commonly referred to as external beam radiotherapy, or an internal approach called brachytherapy. In this issue, there are several chapters that discuss the history, rationale and state of the art for these approaches.

The issue begins with an article on intensity-modulated radiotherapy (IMRT). It explains what is one of the safest treatments for intact prostate cancer while focusing on the origins of IMRT, the critical role it plays in understanding the importance of radiation dose escalation and its clinical outcomes. The safety of IMRT has been ensured by a high degree of conformality enabled the rapid advancement of image-guided technologies. These technologies, including intraprostatic fiducial markers, transabdominal ultrasound, electromagnetic transponders, CT-based guidance and MRI-based guidance are detailed in the subsequent article.

Hypofractionation is an increasingly accepted practice standard, which delivers higher daily radiation doses than conventionally used, and can be subdivided into moderate and extreme schedules. Moderately hypofractionation is expertly presented with an emphasis on level 1 evidence and capped with discussion on the adaption of innovation. Extreme hypofractionation, also commonly referred to as stereotactic ablative body radiotherapy (SABR), is also discussed separately. SABR is an emerging treatment of oligometastatic prostate cancer and also described.

Brachytherapy is a specialized treatment for prostate cancer that can be delivered in either a permanent, low dose-rate (LDR) or temporary, high dose-rate (HDR) technique. Brachytherapy can be used alone or in combination with IMRT for the treatment of intact prostate cancer. Both LDR and HDR are discussed in great detail in this issue. From the most seasoned brachytherapist to the novice starting a practice, there is something for everyone to learn in these expertly written summaries.

Rounding out the discussion of definitive radiation therapy is an article discussing its cost-effectiveness. It is a rare review of the literature focused specifically on the cost-effectiveness of prostate radiation therapy, a topic that is increasing important in a cancer care environment under reform and needing value.

Androgen deprivation therapy is common systemic treatment for prostate cancer and a highly effective adjuvant treatment to radiation therapy. It is also one that raises many questions that an article is dedicated to discuss its rationale, indications, outcomes, caveats, and toxicity. Furthermore, adjuvant chemotherapy also has an emerging role for aggressive disease, both intact and post-prostatectomy, which is discussed in this issue and looks forward to new approaches and personalized therapy.

Radiation therapy may be used as a salvage therapy after definite therapy. Postprostatectomy radiotherapy to the prostate fossa after surgery is a highly effective treatment and the literature supporting its use continues to strengthen. Increasing the utilization of post-prostatectomy radiotherapy is a major thrust in genitourinary (GU) oncology, and the review here provides a clear and concise presentation of the topic needed whether it is for educating patients, clinicians, or researchers. For patients treated definitively with radiation therapy, local salvage is possible but often a confusing topic. In this issue, a review of the salvage local therapies is presented with a focus on LDR and HDR. Both are discussed in detail with a through description of rationale, patient selection, technique and outcomes.

Radium has been proven effective for men with metastatic prostate cancer. With the explosion of immunotherapy options, combination therapy with radium is a logical direction and the current clinical trial landscape is presented. Also, a promising approach, targeted alpha therapy (TAT), which pairs alpha-emitters similar to radium with small molecules for targeted

therapy, is discussed.

Looking forward, there are several exciting future directions for the treatment of prostate cancer. Magnetic resonance imaging (MRI) is the gold-standard for prostate cancer. The field of MRI radiomics, which is drawing much attention with the popularity of deep learning, is perfectly suited to the image-guided radiotherapy and presented in this issue. Molecular biomarkers may help better personalize radiation therapy to individual patients and a survey of the biomarker landscape and areas of active study are presented.

Last, to speed the progress and bring advancements to clinic quickly for patients, surrogate endpoints are needed for prostate cancer due to the long natural history of the disease. This issue concludes with a one-of-a kind review of everything one needs to know to understand the nuanced nature of surrogate endpoints in prostate cancer and suggests a direction for the future.

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