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Platinum Priority – Editorial

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Is Magnetic Resonance Imaging-targeted Biopsy Now the Standard of Care?

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Over the past 8–10 yr, multiparametric magnetic resonance imaging (mpMRI) has changed the diagnostic paradigm for prostate cancer. Before this time, MRI was used mainly as an anatomical staging tool and was most useful for judging the extent of locally advanced disease. MR spectroscopy was available but was a difficult and expensive technique and was highly user-dependent. During this time, 1.5-T magnets were the predominant platform available and image quality for a small organ such as the prostate was difficult to standardise; endorectal coils were also frequently used, which added to the cost and to patient discomfort. From 2010, however, a number of significant changes have occurred in the prostate MRI landscape. The most important of these was the development of mpMRI, specifically diffusion-weighted imaging (DWI) and dynamic contrast enhanced (DCE) sequences. These allowed radiologists to demonstrate prostate cancer that was invisible on T2-weighted anatomic images, and even draw inferences about the grade of tumour present on the basis of the degree of diffusion restriction [1,2]. In addition, contrast sequences took advantage of the porous neovascularity of prostate tumours, which allows these to be imaged and differentiated from benign conditions of the prostate. Combined with T2-weighted imaging, the newly refined DWI and DCE sequences allowed urologists to see prostate cancer before biopsy for the first time. The other important developments included the more widespread availability of 3-T scanners and the development of fusion biopsy platforms, including various ultrasound fusion technologies and in-gantry MRI biopsy equipment. Finally, the development of the Prostate Imaging-Reporting and Data System (PI-RADS) [3] and its widespread dissemination were very important steps towards systematisation and standardisation of protocols for prostate mpMRI.

A number of centres around the world, including our own, were fortunate enough to have the right equipment and the right people in place to begin rapidly exploring the possibilities of this new imaging modality. Within a short time, numerous groups started to publish results for targeted biopsy using MRI and fusion as well as cognitive approaches. This led to a seismic shift in the diagnostic pathway for prostate cancer, from a blind sampling approach to an image-guided, targeted biopsy approach. Over time, various guideline groups assimilated prostate MRI into their recommendations, and the National Institute for Health and Care Excellence and the European Association of Urology now recommend prebiopsy prostate MRI [4,5]. In the past 3–4 yr, several large prospective trials have shown the superiority of the image-guided targeted biopsy pathway over standard transrectal ultrasound biopsy [6–9].

In this issue of *European Urology*, Kasivisvanathan and colleagues [10] present a systematic review and meta-analysis of the current literature on MRI-targeted biopsy. The authors conducted an exhaustive and meticulous review of the evidence, carried out to the highest scientific standards, and conclude that MRI-targeted biopsy is clearly superior to random systematic biopsy. A total of 68 studies enrolling more than 14 000 men have shown us that MRI-targeted biopsy detects 16% more significant prostate cancers than systematic biopsy and avoids the diagnosis of insignificant cancer in a large proportion of men (up to 33%). In the case of detection of significant prostate cancers, it was found that prior biopsy status did not affect the superiority of MRI-targeted biopsy and the detection of significant cancers was similar when using fusion or

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cognitive methods. For the purposes of this review, significant prostate cancer was defined as Gleason $\geq 3 + 4 = 7$. In four of the randomised controlled trials analysed, men with negative MRI findings still underwent a prostate biopsy. The detection rate for significant cancer in these men was 4/192 (2.1%).

We now have the highest level evidence available that MRI-targeted biopsy is superior to standard systematic biopsy for the detection of prostate cancer. The MRI-based pathway addresses the most important criticisms that have been levelled against urologists and radiation oncologists treating men with prostate cancer: failures in the detection and treatment of significant disease and overtreatment of insignificant cancer. Prostate MRI has removed a great deal of the uncertainty associated with the use of prostate-specific antigen testing, which for decades has caused anxiety for physicians and their patients because of its poor specificity.

The question now is what urologists and their radiologist colleagues around the world do with this information. Prostate MRI is not readily available in all centres for a variety of reasons, including cost, expertise, and access to MRI scanning time. In addition, image quality can vary widely, even across imaging facilities in the same city. The development of an integrated MRI-based pathway for prostate cancer diagnostics is time-consuming and requires a dedicated team approach in which urologists and radiologists work together. By necessity, this should include regular radiology meetings to discuss scans and biopsy results and forwarding copies of all histology to the reporting radiologists to allow them to validate their reporting. Many units may never see MRI scans from other facilities and therefore will not know if their image quality is poor, average, or good. It is therefore vital to visit established centres and harness their expertise to help in establishing MRI programmes in novice centres. Finally and most importantly, urologists and their patients need to understand and accept that prostate MRI does have a false negative rate that has been reported at between 5% and 20%. In our experience, the false negative rate has fallen over time with increasing experience and in-house review of histology results. However, no test is perfect and therefore clinical judgement and risk stratification are important in selecting men for biopsy despite negative MRI findings.

We congratulate the authors on completing this extremely valuable review that has firmly established an evidence base for the superiority of MRI-targeted prostate biopsy. The future is bright, at least on the DWI.

Conflicts of interest: The authors have nothing to disclose.

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