Editorial Commentary

Are short magnetic resonance imaging protocols the future of prostate imaging?

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With great interest, we read the recently published work by van der Leest *et al.* (1) on *European Urology*. The authors conducted a multi-reader, prospective study to investigate the diagnostic performance of standard multiparametric-MRI (mp-MRI) versus unenhanced biparametric-MRI (bp-MRI) in three planes and in one plane ("fast" bp-MRI) to detect high-grade prostatic carcinoma (PCa), in biopsy-naïve men. The authors demonstrated that all protocols present a similar diagnostic performance in ruling out high-grade PCa. In particular, a "fast" bp-MRI protocol, only including axial T2w, ADC map, and high b-value images (three image sets), did not result in decreased detection of high-grade PCa. *Table 1* summarizes the imaging sequences included in each of the protocols. Even though the negative predictive value (NPV) of "fast" bp-MRI was lower than that of bp-MRI and mp-MRI, the difference in NPV was clinically negligible (0.15%), and the NPV of "fast" bp-MRI remained high (97%). More details regarding diagnostic performance metrics reported using the three different protocols are shown in *Table 2*. The authors conclude that "fast" unenhanced bp-MRI can double prostate MRI capacity and reduce its costs, without impairing the detection of high-grade PCa.

It is interesting to note that the imaging protocol used by the Authors is not completely in line with current Prostate Imaging - Reporting and Data System (PI-RADS) guidelines. The main issues are the use of a gap in T2w and diffusion weighted imaging (DWI) sequences and the in-plane resolution of T2w images. This represents a potential limitation of the study, although reported results and accuracy of PI-RADS scoring does not seem negatively affected. Furthermore, recent publications highlighted the low adherence to PI-RADS acquisition guidelines both in the clinical and academic settings (2-4).

Mp-MRI is considered the technique of choice to evaluate patients with suspicion of PCa, however, the long imaging acquisition time have contributed to a strong interest in reducing the length of mp-MRI. Several papers have demonstrated that bp-MRI protocols represent a valid alternative to mp-MRI (5-7). This is mainly due to the limited added value of dynamic contrast enhanced (DCE) over T2w imaging and DWI when using PI-RADS, for diagnosis of clinically significant PCa (8,9). In this study, van der Leest *et al.* clearly confirm the high diagnostic accuracy of shortening prostatic MR imaging, in biopsy-naïve men with suspicion of PCa. The authors introduce an additional protocol modification and novelty, to further decrease the length of bp-MRI protocols, by eliminating coronal and sagittal T2w planes, thus reducing the overall acquisition time to 8 minutes. Additional strengths of the manuscript are the multireader evaluation, and a direct cost analysis confirming the benefits in terms of cost reduction (10). This paper nicely demonstrates the value of a "fast" bp-MRI protocol, without the administration of contrast

Table 1 Included sequences in each of the MRI protocols (1)

	MP-MRI	BP-MRI	"FAST" BP-MRI
Axial T2w	■	■	■
Sagittal T2w	■	■	
Coronal T2w	■	■	
Axial DWI	■	■	■
3D DCE	■		

BP, biparametric; MP, multiparametric; MRI, magnetic resonance imaging; T2w, T2-weighted sequence; DWI, diffusion weighted imaging sequence; DCE, dynamic contrast enhanced sequence.

Table 2 Reported accuracy values for the three MRI protocols (1)

	Sensitivity	Specificity	NPV	PPV
MP-MRI	95 (91–97)	69 (64–73)	97 (94–98)	57 (51–62)
BP-MRI	95 (91–97)	69 (64–73)	97 (94–98)	57 (51–62)
"FAST" BP-MRI	95 (91–97)	65 (61–70)*	97 (94–98)*	54 (49–60)*

BP, biparametric; MP, multiparametric; MRI, magnetic resonance imaging; NPV, negative predictive value; PPV, positive predictive value. All values expressed in percentage with 95% confidence interval in parenthesis. *, Statistically significant difference (P<0.001).

agent, as a feasible tool for PCa detection, significantly reducing both acquisition and interpretation time, while maintaining comparable diagnostic accuracy to bp-MRI and mp-MRI.

Indeed, in recent years evidences in literature have pointed to a greater role for bp-MRI (11,12). As high-resolution T2w images are the most important for lesion morphologic assessment and staging, while DWI and ADC maps for lesion detection and tissue characterization, at least in the peripheral zone, the role of gadolinium-based contrast has become debated (12). Some authors support a significant role in peripheral lesion detection while others advocate its complete removal from routine prostate MRI protocols (11). For example, unenhanced prostate MRI might allow for an accurate assessment of PCa local stage (13). A previous paper underlined that the addition of DCE images does not improve prostate cancer staging accuracy for expert readers (14). This trend is also reflected in the latest revision (v2.1) of the PI-RADS guidelines that acknowledged a role for bp-MRI, even if currently limited to some clinical scenarios (8). For example, mp-MRI should still be employed in patients at high risk for clinically significant PCa.

The future of prostate cancer imaging is not limited to conventional MRI protocols. As in other fields of medicine and especially radiology, there have been a plethora of studies focused on radiomics and machine learning applications (15). These have shown good results in prostate imaging, from gland and lesion segmentation to cancer detection and characterization, as well as tumor staging (16-18). Input data for such analyses has been represented not only by MRI but also from other imaging modalities (19).

In conclusion, the future of prostate MRI looks bright and, just as PI-RADS are an evolving document in accordance to new experiences and data available, so are acquisition protocols. While mp-MRI is still the reference standard, bp-MRI could soon become an equal and strong alternative.

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Footnote

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