New Standards of Care

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Biparametric MRI: A New Standard for Prostate Cancer Imaging?

A lone and discordant voice supported by few at first, biparametric prostate magnetic resonance imaging has been gradually gaining attention and visibility as a reliable, faster, and cheaper alternative to conventional multiparametric magnetic resonance imaging and could become a new standard of care in the near future.

Key Points
- The role of magnetic resonance imaging has grown over the years for detection and characterisation of prostate cancer.
- An imaging protocol without the need for contrast agent administration could lower the costs and time requirements, aiding wide scale adoption.
- Recent studies support the use of biparametric magnetic resonance imaging for prostate cancer screening and active surveillance.
- Implementation of biparametric MRI could improve availability of the exam to the public and ease workload organisation as demand continues to rise.

Introduction
Magnetic resonance imaging (MRI) has long-established its valuable role as the imaging cornerstone in prostate cancer management, with the main current application being lesion detection for biopsy guidance (EAU Guidelines 2019). However, MRI could also play a role in other settings, ranging from prostate cancer local staging to diagnosis of disease recurrence after treatment. Overall, its recognition and reliability have led to the development of new diagnostic pathways which are favourably considered by both patients and physicians. This is at least partly due to the efforts made towards the standardisation of the imaging acquisition protocol and interpretation culminated in the release of the Prostate Imaging Reporting and Data System (PI-RADS) guidelines (Turkbey et al. 2019). These have undergone several revisions over the years, and the current proposed standard of care is represented by multiparametric magnetic resonance imaging (MRI). This consists of a protocol based on three sequences (T2, diffusion and perfusion-weighted imaging). Unfortunately, this approach requires a relatively long scan time on average as well as the administration of a gadolinium-based contrast agent, with a consequent impact on exam cost and safety. To overcome these downsides of multiparametric MRI, the use of alternative protocols without the use of contrast agents has been proposed, broadly referred to as biparametric MRI. Embracing this approach could have advantageous financial implications and increase the accessibility of prostate MRI exams without sacrificing overall diagnostic accuracy (Porter et al. 2019; van der Leest et al. 2019).

Prostate Cancer Screening and Lesion Detection
The adoption of multiparametric MRI for prostate cancer detection has become widespread since its use is recommended...
both before the first biopsy and in case of persisting clinical suspicion before a re-biopsy (EAU Guidelines 2019). Evidence suggesting that biparametric MRI could replace multiparametric MRI in this setting has been piling up, with recent meta-analyses confirming that there is no significant difference in terms of diagnostic accuracy between these two strategies (Cuocolo et al. 2021; Alabousi et al. 2019). It has also been highlighted that pre-biopsy biparametric MRI can adapt well to clinical practice and aid in the stratification of risk (Choi et al. 2020). A prospective clinical trial confirmed that biparametric MRI is a superior screening test compared to prostate-specific agent or ultrasound (Eldred-Evans et al. 2021). Nevertheless, current guidelines still underscore that multiparametric MRI should be preferred in a wide range of clinical scenarios (Turkbey et al. 2019). This is in contrast with the findings of a work specifically focused on the PI-RADS v2.1 scoring system, reporting that the interobserver reliability and diagnostic performance of biparametric MRI was comparable with those of multiparametric MRI for prostate cancer detection (Tamada et al. 2021; Perez et al. 2020).

Prostate Cancer Staging and Detection of Local Recurrence

While prostate MRI has the ability to assess the local extension of prostate cancer, its accuracy is not as high as desirable. A recently proposed scoring system (EPE grade) could help standardise and increase the value of MRI in this setting, just like PI-RADS did for cancer detection. As for biparametric MRI, it appears that the lack of contrast enhanced images does not negatively impact the accuracy of the exam (Christophe et al. 2020; Stanzione et al. 2019). This is probably related to the fact that most signs of local invasiveness are better evaluated on T2 weighted images.

There is an overall lack of studies assessing the role of biparametric MRI for patient treated with either radical prostatectomy or radiation therapy and at risk of local recurrence. The main reason behind this is that the sensitivity of T2 weighted images for detection of recurrence is rather low, as fibrous scar tissue can mimic recurrence. Similarly, diffusion weighted imaging is not as reliable for the detection of tumoural tissue after treatment. On the other hand, dynamic contrast enhanced images are considered the most accurate for the detection of local recurrence (Panebianco et al. 2021).

Active Surveillance

Given the biological behaviour of prostate cancer, there is a significant proportion of low-grade lesions that may be managed with an active surveillance approach. These patients traditionally underwent periodical systematic biopsies of the prostate to identify eventual disease progression. Recent trials have shown that the MRI-targeted biopsies provide an added value during active surveillance, improving patient management (Klotz et al. 2019). The increased workload due to this practice, however, may be challenging to manage and biparametric MRI may prove a valuable optimisation in terms of acquisition time and exam scheduling in busy radiology departments. A study conducted in the United Kingdom reported a 55% reduction in scan time, significantly increasing the number of scans performed weekly (Sushentsev et al. 2020).

Conclusions

The increased demand for MRI is supported by current evidence in literature for a wide range of applications in prostate cancer patients. While current imaging guidelines advocate for the administration of contrast agents, biparametric MRI has also gained attention and recognition as a viable alternative in selected patients. This implementation of MRI could improve availability of the exam to the public and ease workload organisation as demand continues to rise.

Conflict of Interest

None.

REFERENCES


