



New Standards of Care

274. Wong Hon Tym

What COVID-19 has Taught Us:
Insights on Singapore's Healthcare
System and the New Normal

286. Arnaldo Stanzione, Renato

Cuocolo, Vincenzo D'Ambrosio
Biparametric MRI: A New Standard
for Prostate Cancer Imaging?

288. Miroslav Mađarić, Vesna
Nesek-Mađarić

How Consistent is Medical
Information on the Internet?

297. Henrique Martins, Luís Lino

Digital Anamnesis: Integrating
Classic History Taking with
Digital Health

301. Stefan Heinemann

Smart Circulator or Value-Driven
Perspective for Patients?

305. Carla Riera Segura, Laura Valenzuela
López, Natàlia Pérez de la Ossa

Telestroke 2.0: Innovative Approach
to Optimise Timing and Automate
Workflow



Biparametric MRI: A New Standard for Prostate Cancer Imaging?

Author: Arnaldo Stanzione | Department of Advanced Biomedical Sciences | University of Naples Federico II | Naples, Italy

Author: Vincenzo D'Ambrosio, MD | Department of Advanced Biomedical Sciences | University of Naples Federico II | Naples, Italy

Author: Renato Cuocolo | Department of Clinical Medicine and Surgery | University of Naples Federico II | Naples, Italy

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

- Alabousi M, Salameh JP, Gusenbauer K et al. [2019] Biparametric vs multiparametric prostate magnetic resonance imaging for the detection of prostate cancer in treatment-naïve patients: a diagnostic test accuracy systematic review and meta-analysis, *BJU Int*, 124:209-220.
- Choi MH, Lee YJ, Jung SE [2020] Tracking Changes in Clinical Practice Patterns Following Prebiopsy Biparametric Prostate MRI, *Acad. Radiol.*, 27:1255-1260.
- Christophe C, Montagne S, Bourrelie S et al. [2020] Prostate cancer local staging using biparametric MRI: assessment and comparison with multiparametric MRI, *Eur. J. Radiol.*, 132: 109350.
- Cuocolo R, Verde F, Ponsiglione A et al. [2021] Clinically Significant Prostate Cancer Detection With Biparametric MRI: A Systematic Review and Meta-Analysis, *Am. J. Roentgenol.*, 1-14.
- Eldred-Evans D, Burak P, Connor MJ et al. [2021] Population-Based Prostate Cancer Screening With Magnetic Resonance Imaging or Ultrasonography, *JAMA Oncol.*, 7: 395.
- EAU Guidelines. Edn. presented at the EAU Annual Congress Barcelona 2019. Available from <https://uroweb.org/guideline/prostate-cancer>
- Klotz L, Loblaw A, Sugar L et al. [2019] Active Surveillance Magnetic Resonance Imaging Study (ASIST): Results of a Randomized Multicenter Prospective Trial, *Eur. Urol.*, 75:300-309.
- Panebianco V, Villeirs G, Weinreb JC et al. [2021] Prostate Magnetic Resonance Imaging for Local Recurrence Reporting (PI-RR): International Consensus -based Guidelines on Multiparametric Magnetic Resonance Imaging for Prostate Cancer Recurrence after Radiation Therapy and Radical Prostatectomy, *Eur. Urol. Oncol.*
- Perez IM, Jambor I, Kauko T et al. [2020] Qualitative and Quantitative Reporting of a Unique Biparametric MRI: Towards Biparametric MRI-Based Nomograms for Prediction of Prostate Biopsy Outcome in Men With a Clinical Suspicion of Prostate Cancer (IMPROD and MULTI-IMPROD Trials), *J. Magn. Reson. Imaging*, 51:1556-1567.
- Porter KK, King A, Galgano SJ et al. [2019] Financial implications of biparametric prostate MRI, *Prostate Cancer Prostatic Dis.*
- Stanzione A, Ponsiglione A, Cuocolo R et al. [2019] Abbreviated Protocols versus Multiparametric MRI for Assessment of Extraprostatic Extension in Prostatic Carcinoma: A Multireader Study, *Anticancer Res.*, 39:4449-4454.