Platinum Opinion

Focus on the Quality of Prostate Multiparametric Magnetic Resonance Imaging: Synopsis of the ESUR/ESUI Recommendations on Quality Assessment and Interpretation of Images and Radiologists' Training

Maarten de Rooij [a], Bas Israël [a], Tristan Barrett [b], Francesco Giganti [c,d], Anwar R. Padhani [e], Valeria Panebianco [f], Jonathan Richenberg [g], Georg Salomon [h], Ivo G. Schoots [i,j], Geert Villeirs [k], Jochen Walz [l], Jelle O. Barentsz [a,*

[a] Department of Radiology, Nuclear Medicine, and Anatomy, Radboudumc, Nijmegen, The Netherlands; [b] Department of Radiology, CamPARI Prostate Cancer Group, Addenbrooke's Hospital and University of Cambridge, Cambridge, UK; [c] Department of Radiology, University College London Hospital NHS Foundation Trust, London, UK; [d] Division of Surgery & Interventional Science, University College London, London, UK; [e] Paul Strickland Scanner Centre, Mount Vernon Cancer Centre, Northwood, UK; [f] Department of Radiological Sciences, Oncology and Pathology, Sapienza University of Rome, Rome, Italy; [g] Department of Imaging, Brighton and Sussex University Hospital NHS Trust, Brighton, UK; [h] Martini Clinic, University Medical Center Hamburg-Eppendorf, Hamburg, Germany; [i] Department of Radiology & Nuclear Medicine, Erasmus MC University Medical Center, Rotterdam, The Netherlands; [j] Department of Radiology, Netherlands Cancer Institute, Amsterdam, The Netherlands; [k] Department of Radiology, Ghent University Hospital, Ghent, Belgium; [l] Department of Urology, Institute Paoli-Calmettes Cancer Center, Marseille, France*

Introduction

Multiparametric magnetic resonance imaging (mpMRI) has an established upfront role in the diagnostic pathway for men with a clinical suspicion of prostate cancer [1,2]. The patient benefits from prebiopsy use of prostate MRI to decide on subsequent MRI-guided biopsy (MRI pathway) compared to a systematic transrectal ultrasound–guided biopsy approach (SB) in three ways. The MRI pathway can reduce the number of unnecessary biopsies, minimise overdiagnosis of low-grade (grade group [GG] $\geq$1) cancers with noninferiority for detecting clinically significant (GG $\geq$ 2) cancers [3], and improve risk stratification of patients by facilitating targeted biopsies [4].

Incorporation of prostate MRI in the diagnostic pathway will lead to an increase in demand for high-quality mpMRI. In Europe and the USA, this is predicted to equate annually to approximately two million additional prostate MRI scans. In clinical practice, there is considerable variation in acquisition parameters and image quality for prostate MRI [5]. It is of paramount importance that all examinations and subsequent reports are of the highest quality for a test that is central to

triage. Poor quality will result in both unnecessary biopsies and missed diagnosis of clinically significant cancer. Paradoxically, there is a lack of agreed—let alone stringent—standards for acquisition that are applicable to all radiologists who independently read prostate MRI scans. To ensure the availability of high-quality prostate MRI scans between centres and radiologists at this time of expansion, the Prostate MRI Quality Subcommittees of the European Society of Urogenital Radiology (ESUR) and the European Association of Urology Section of Urologic Imaging (ESUI) formulated consensus-based criteria for prostate MRI acquisition, reporting, and training [6].

Synopsis of quality consensus statements

The ESUR and ESUI consensus paper comprises a structured and systematic summary of the opinions of recognised experts in diagnostic prostate MRI on quality measures that are not adequately addressed by existing literature. For this purpose, a modified Delphi-method was used with a panel of 44 expert prostate radiologists and urologists specialised in prostate imaging. The panellists completed two rounds of

* Corresponding author: Department of Radiology, Radboudumc, Nijmegen, P.O. Box 9101, The Netherlands.
E-mail address: jelle.barentsz@radboudumc.nl (J.O. Barentsz).

Table 1 – Consensus-based recommendations on image quality assessment, evaluation of interpretation performance, and reader experience with prostate mpMRI [6]

Image quality	Interpretation performance	Reader experience
Checking and reporting on image quality should be performed	To evaluate interpretation performance, radiologists should use self-performance tests	Before interpreting prostate mpMRI scans, radiologists should receive training
		Radiologists should undertake a combination of core theoretical prostate mpMRI courses and hands-on practice at workstations with supervised reporting
		Training should be certified
Visual image assessment by radiologists is adequate for determining diagnostic acceptability	Assessment of radiologists' performance should be performed using histopathology feedback and by comparison to expert reading	For good prostate mpMRI quality, assessment of technical quality measures should be in place
		A peer review of image quality should be organised
		Minimal technical requirements of PI-RADS v2 should be met
Image quality control should be performed at ≥6-mo intervals or in 5% of studies	To evaluate the radiologists' interpretation performance, external performance assessments should be done	PI-RADS should be used as the basis for assessments
		Prostate radiologists should be aware of alternative diagnostic methods
		Radiologists should participate in MDT meetings or attend MDT-type workshops
		The MDT must include MRI review with histology results
The radiology community should work on a standardised phantom for ADC measurements		The MDT must include urology, radiology, pathology, and medical and radiation oncology specialists
		Prostate radiologists should have knowledge on the added value of MRI and the consequences of false results
		Prostate radiologists should have roles in shared decision-making with respect to biopsy strategies

ADC = apparent diffusion coefficient; MDT = multidisciplinary team; mpMRI = multiparametric magnetic resonance imaging; PI-RADS = Prostate Imaging-Reporting and Data System.

a questionnaire comprising 55 items addressing three main topics: (1) assessments of image quality for prostate MRI; (2) requirements for radiologists interpreting and reporting prostate MRI; and (3) learning and experience prerequisites for independent reporting. Thirty-one of the 55 questions (56%) were rated for agreement on a 9-point scale, while the other 24 (44%) were multiple choice or open questions. The consensus-based recommendations formulated are summarised in Table 1.

Image quality assessment

The panellists agreed that commenting on image quality based on visual assessment by the reporting radiologist is mandatory in order to indicate the diagnostic power of the MRI study. For MRI radiographers this will provide feedback for quality improvement. For urologists, it will indicate the value of the particular MRI scan in their clinical management, that is, how reliably a GG ≥ 2 cancer can be ruled out or ruled in, or whether the scan should be repeated. A set of objective criteria for assessing image quality is not provided in the current consensus paper. The ESUR/ESUI Prostate MRI Quality Subcommittees hope to develop a consensus-based scoring system that will require prospective validation to fill this gap.

Prerequisites for interpretation and reporting for MRI readers

The panellists agreed that radiologists should monitor their individual diagnostic performance through (1) audit against histopathology feedback; (2) (self-)performance tests; and

(3) comparison of their results against expert readers. In addition, benchmarking to peers' performances should be undertaken.

Radiologists' learning and reporting expertise

The members of the expert panel suggest mandatory use of the Prostate Imaging-Reporting and Data System (PI-RADS) standardised reporting system and the introduction of distinct quality criteria levels for radiologists who want to become independent prostate MRI readers or expert readers. The criteria are based on the number of cases read, cases per year, (self-)performance tests, and percentage agreement with expert training centres (Table 2). Before reading prostate MRI scans, radiologists must attend a combination of theoretical and hands-on courses, followed

Table 2 – Consensus-based criteria for basic versus expert radiologists [6]

Criterion	Basic	Expert
Minimum number of supervised cases before independent reporting	100	N/A
Minimum number of cases read	400	1000
Minimum number of cases per year	150	200 [a]
Examination interval (yr)	1	4
Agreement in double reads with expert centre (%)	80	≥90

N/A = not applicable.
[a] No panel majority; the most frequent answer was 200 cases/yr (18/44 of panellists, 41%); the second most frequent answer was ≥500 cases/yr (14/44 of panellists, 32%).

by supervised education. Participation in multidisciplinary team (MDT) meetings is compulsory. In MDTs, urologists, pathologists, and radiologists are advised to critically review PI-RADS scores versus the histopathology of biopsy cores or whole-mount radical prostatectomy specimens in order to reduce overdiagnosis and underdiagnosis of GG ≥ 2 cancers. Furthermore, radiologists should play an active role in the decision-making process on the need for MRI-targeted biopsies and the method by which they are carried out.

Conclusions

This consensus expert opinion report from ESUR and ESUI members builds on the standards set out in the PI-RADS documents. It provides guidance on prostate MRI acquisition and sets out metrics to gauge and to improve on the reporting expertise of clinicians involved in prostate cancer diagnosis. These criteria, which were derived using the Delphi method, are likely to serve as a starting point for certification of individual radiologists for performing unsupervised reading of prostate MRI scans and for accreditation of centres for their prostate MRI diagnostic pathway. The goal is a centre providing high-quality image acquisition, confident and reliable MRI reports, precise targeted biopsies, and accurate pathology assessment. More immediately, these criteria may help to focus the entire MDT on MRI quality and thus continuous development of radiological expertise and clinical-radiological dialogue.

Conflicts of interest: The authors have nothing to disclose.

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