# Editorial European Urology: Focus on quality of prostate multi-parametric MRI: synopsis of ESUR/ESUI recommendations on image-quality assessment, interpretation and radiologists' training

Maarten de Rooij, Bas Israël, Tristan Barrett, Francesco Giganti, Anwar R Padhani, Valeria Panebianco, Jonathan Richenberg, Georg Salomon, Ivo Schoots, Geert Villeirs, Jochen Walz, Jelle Barentsz on behalf of the ESUR and ESUI quality panel

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## Introduction

Multi-parametric MRI (mpMRI) has an established upfront role in the diagnostic pathway of men with a clinical suspicion of prostate cancer.[1,2] Compared to a systematic transrectal-ultrasonography-guided biopsy approach, the pre-biopsy use of prostate MRI and subsequent MRI-guided biopsy has several advantages. The MRI-pathway can reduce the number of unnecessary biopsies and reduce overdiagnosis of low-grade cancer, with non-inferiority in detecting clinically significant cancer.[3] Also, the use of mpMRI allows for better risk-stratification of patients by enabling targeted biopsies.[4]

Incorporation of prostate mpMRI in the diagnostic pathway will lead to an increased use: in excess of one million extra examinations per year can be expected in Europe and the USA. It is of utmost importance that all these examinations are executed at the highest image acquisition and reporting quality level, becasue suboptimal quality may result in unnecessary biopsies, under- and overreporting, and missed cancer diagnosis. Currently, there is a lack of consensus on how to assure high quality for both image acquisition and reporting quality by radiologists who independently read prostate mpMRI. In response, the Quality Subcommittee of the European Society of Urogenital Radiology (ESUR) and the EAU Section of Urologic Imaging (ESUI) formulated consensus-based criteria for acquisition, reporting, and training to achieve consistent high-quality prostate mpMRI.[ref Eur Radiol]

## Synopsis Quality Consensus Statements

The ESUR/ESUI quality statements summarise in a structured and systematic way the opinions of recognized experts in diagnostic prostate mpMRI on issues that are not adequately addressed by existing literature. For this purpose, a modified Delphi method was used with a panel of 44 urogenital radiologists and urologists. The panellists completed two rounds of a questionnaire with 55 items, addressing three main topics: 1) assessments of the image quality of prostate mpMRI; 2) requirements for those interpreting and reporting prostate mpMRI; 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, the other 24/55 (44%) were multiple-choice or open questions. The formulated consensus-based recommendations are summarized in Table 1.

### Assessment of image quality

In clinical practice there is considerable variation in acquisition parameters and image quality of prostate mpMRI.[5] The panellists agreed that reporting of image quality by visual assessment by the reporting radiologist must be performed, in order to provide an indication of the diagnostic

appropriateness of the MR-images. This ensures that the radiologist focuses on both the detection of tumour suspicious regions but also on the quality of the images on which interpretations are done. For radiographers this will aid in quality improvement efforts. For the urologist, it will indicate the likely impact of mpMRI quality on their clinical management. That is, whether high-grade cancer can be confidently ruled-in or ruled-out, or whether the examination should be repeated. A set of objective criteria to assess the image quality is not provided in the current consensus paper, but efforts are being made within the ESUR/ESUI Quality Subcommittee to develop a consensus-based scoring system that will require prospective validation.

Prerequisites for interpretation and reporting for MRI readers

The panellists agreed that (self-)performance tests need to be done to assess the individual radiologists' performance, with histopathologic feedback, and by comparing their results to expert-reading. Additionally, external performance assessments must be done.

Radiologists' learning and reporting expertise

The members of the expert-panel suggest the mandatory use of the Prostate Imaging–Reporting and Data System (PI-RADS) standardised reporting system, and the introduction of quality-related criteria 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 interval, and agreement percentage with expert-training centres (Table 2). Prior to reading prostate mpMRI, radiologists must attend a combination of theoretical and hands-on courses, followed by supervised education. Participation in multidisciplinary team meetings is mandatory. In multidisciplinary teams urologists, pathologists, and radiologists are advised to critically review the outcome of the PI-RADS scores versus histopathology of biopsy-cores or whole-mount radical prostatectomy specimens, in order to reduce over- and underdiagnosis of clinically significant cancers. Furthermore radiologists should play an active role in the decision-making process on the need for and method by which MRI-targeted biopsies are undertaken.

**Discussion and conclusions**

This Delphi consensus expert opinion from ESUR- and ESUI-members is highly relevant for radiologists and urologists who are involved in prostate cancer diagnosis. This is a starting point for certification of individual radiologists to perform unsupervised reading of prostate mpMRI and to accredit centres for their prostate cancer diagnostic pathway (i.e. high-quality image acquisition, optimal MRI and pathology assessment, and accurate targeted biopsies). This process will enable the quality of mpMRI-diagnostic pathways to improve weekly and become validated for clinical practise.

**Table 1 (from Eur Radiol): Consensus-based recommendations on image-quality assessment (section 1), evaluation of interpretation performance (section 2), and reader experience with prostate mpMRI (section 3). Abbreviations: ADC = apparent diffusion coefficient; MDT = multidisciplinary team; mpMRI = multi-parametric magnetic resonance imaging; PI-RADS = Prostate Imaging-Reporting and Data System.**

| Image-quality | Interpretation performance | Reader experience |
|---|---|---|
| Checking and reporting the image-quality should be performed. | To evaluate interpretation performance, radiologists should use self-performance tests | Before interpreting prostate mpMRI 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 enough to determine diagnostic acceptability | Assessment of radiologists' performance should be performed using histopathologic feedback and by comparing to expert reading | For good prostate mpMRI quality, assessment of the technical quality measures should be in place |
| | | A peer review of image-quality should be organized |
| | | Minimal technical requirements of PI-RADS v2 should be met |
| Image-quality control should be performed ≥6 monthly 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 of 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 radiologic community should work on a standardized phantom for apparent diffusion coefficient (ADC) measurements | | The MDT must include urology, radiology, pathology, medical- and radiation oncology |
| | | Prostate radiologists should have knowledge on the added value of MRI and consequences of false results |
| | | Prostate radiologists should have roles in shared decision-making with respect to biopsy strategies |

**Table 2 (from Eur Radiol): Consensus based criteria of 'basic' versus 'expert' radiologists. N/A = not applicable.**

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

* No panel majority (most frequent answer 200 cases/year [41%; 18 of 44 panellists]; second most frequent answer was ≥500 cases/year [32%; 14 of 44 panellists])

**References:**


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