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Clinical Genitourinary Cancer

Concordance Between the Expert Reading of Biparametric-MRI and the Non-Expert Multiparametric-MRI for the Detection of Clinically Significant Prostate Cancer: Clinical Implications.

--Manuscript Draft--

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Abstract:	Purpose Prostate-magnetic resonance imaging (MRI) interpretation is challenging, with expertise playing a crucial role. Biparametric MRI (bpMRI) is gaining popularity in experienced centers due to its time and cost advantages over multiparametric MRI (mpMRI). We aim to analyze concordance between non-expert radiologist PI-RADS from mpMRI and expert radiologist PI-RADS from bpMRI, and its clinical implications. Material and Methods 222 men suspected of having prostate cancer (PCa) and mpMRI reported by non-expert radiologists were referred to a reference center for transperineal MRI-TRUS fusion biopsy where an expert radiologist reported bpMRI PI-RADS 2.1 and segmentation, blinded to external mpMRI. Mapping targeted suspected lesions and 12-core systematic biopsies were performed. Clinically significant PCa (csPCa) was diagnosed when ISUP-grade group was ≥2. Results Concordance between both PI-RADS existed in 49.1% of cases (Kappa index 0.288). In 102 cases (45.9%), expert reclassification to lower PI-RADS existed, while an increase existed in 11 cases (5.0%), p <0.001. Agreement existed in 30.8% of non-expert PI-RADS 3, 43.6% of PI-RADS 4, and 83.7% of PI-RADS 5, p <0.001. Potential clinical implications included 27% reduction in prostate biopsies when using expert bpMRI readings compared to non-expert mpMRI readings (p < 0.001), while undetected csPCa were 4.2% and 3.4%, respectively, p =0.669. Over-detection reduction of insignificant PCa was 29.4% and 0%, respectively, p =0.034. Conclusions

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	Concordance between non-expert PI-RADS mpMRI and expert PI-RADS bpMRI was low, increasing with non-expert PI-RADS. Expert reclassification would reduce prostate biopsies by more than one quarter and over-detection of iPCa, while csPCa detection remained similar. WC 250
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Responses to the Reviewer comments:

We sincerely appreciate your comments, which have significantly contributed to enhancing our manuscript. Responses to the comments are below, and modifications in the manuscript have been highlighted in red.

1) In addition to references 15 and 16, it is suggested to include the ESUR/ESUI article by de Rooij et al. on the experience of radiologists (10.1007/s00330-020-06929-z).

Response: The requested reference has been included with the number 17 and referenced in the manuscript in line 99.

2) The main point that needs to be clarified is how PI-RADS v2.1 was applied to PI-RADS 3 lesions in the peripheral zone without the use of contrast. It is essential to explain in detail how these readings compare with those of mpMRI.

Response: Thank you very much for your valuable comment. The following clarifying remark has been added to the discussion in lines 318-322, "*The PI-RADS v. 2.1 reading model can be applied without the use of contrast for PI-RADS 3 lesions in the peripheral zone (PZ), as the dominant sequence in this region is the diffusion-weighted sequence. Contrast material is only relevant for a potential upgrade to PI-RADS 4 in those PI-RADS 3 lesions that show enhancement after contrast administration. For this reason, in our study, there might be a higher proportion of PI-RADS 3 lesions in the expert interpretation using bpMRI".* We have also included two additional bibliographic references, numbered 34 and 35:

- *34. Turkbey, B., Rosenkrantz, A. B., Haider, M. A., Padhani, A. R., Villeirs, G., Macura, K. J., Tempany, C. M., Choyke, P. L., Cornud, F., Margolis, D. J., Thoeny, H. C., Verma, S., Barentsz, J., & Weinreb, J. C. (2019). Prostate Imaging Reporting and Data System Version 2.1: 2019 Update of Prostate Imaging Reporting and Data System Version 2. European urology, 76(3), 340–351.*
- *35. Asif, A., Nathan, A., Ng, A., Khetrapal, P., Chan, V. W., Giganti, F., Allen, C., Freeman, A., Punwani, S., Lorgelly, P., Clarke, C. S., Brew-Graves, C., Muirhead, N., Emberton, M., Agarwal, R., Takwoingi, Y., Deeks, J. J., Moore, C. M., Kasivisvanathan, V., & PRIME Trial Group (2023). Comparing biparametric to multiparametric MRI in the diagnosis of clinically significant prostate cancer in biopsy-naive men (PRIME): a prospective, international, multicentre, non-inferiority within-patient, diagnostic yield trial protocol. BMJ open, 13(4), e070280.*

3) It is recommended to add the original publication of PI-QUAL v1 (10.1016/j.euo.2020.06.007), in addition to reference 22.

Response: The requested reference has been added as number 23.

4) PI-QUAL ≥3 should be defined as "sufficient" diagnostic quality, not "adequate."

Response: The terminology has been revised, using "sufficient" instead of "adequate" to describe the diagnostic quality in line 139.

5) The article would benefit from including a set of images illustrating the agreement or disagreement between the initial readings and those of the expert.

Response: An example of the disagreement between expert and non-expert readings can be observed in Figure 4.

Thank you for your time and valuable feedback, which have significantly contributed to improving the quality of our work.

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Declaration of interests

☒The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Table 1. Characteristics of men with suspected PCa referred for prostate biopsy at the study center.

Characteristic	Measurement
Number of men	222
Median age (IQR), years	67 (61-72)
Median PSA (IQR), ng/ml	6.8 (5.0-9.2)
Suspicious DRE, n (%)	24 (11.3)
Repeated biopsy, n (%)	40 (18.8)
PCa family history, n (%)	29 (13.6)
Median Prostate volume (IQR), cc	47 (35-65)
mpMRI lesions, n (%)	
1	169 (76.1)
2	43 (19.4)
3	10 (4.5)
PI-RADS of the index lesion, n (%)	
2	4 (1.8)
3	26 (11.7)
4	149 (67.1)
5	43 (19.4)
Median larger diameter of the index lesion, mm (IQR)	11 (9-15)
Location of index lesions, n (%)	
Peripheral zone	157 (70.7)
Transitional-central zone	60 (27.0)
Anterior zone	5 (2.3)
Apical zone	65 (29.3)
Median cores obtained, n (IQR)	21 (19-24)
PCa detection, n (%)	152 (68.5)
csPCa detection, n (%)	118 (53.2)
iPCa detection, n (%)	34 (15.3)

n =number; IQR =interquartile range; PSA =prostate-specific antigen; DRE =digital rectal examination; mpMRI =multiparametric magnetic resonance imaging; PI-RADS =prostate imaging-report and data system; PCa =prostate cancer; cs =clinically significant; i =insignificant

Table 2. Correlation of PI-RADS scores between general and expert radiologists across different centers.

PI-RADS from external centers	Number of cases, (%)	PI-RADS from the study center, n (%)			p Value
		Decrease	Concordance	Increased	
1	0 (0)	0 (0)	0 (0)	0 (0)	-
2	4 (1.9)	0 (0)	0 (0)	4 (100)	-
3	26 (11.7)	14 (53.8)	8 (30.8)	4 (15.4)	**< 0.001**
4	149 (67.1)	81 (54.4)	65 (43.6)	3 (2,0)	**< 0.001**
5	43 (19.4)	7 (16.3)	36 (83.7)	0 (0)	-
All	222 (100)	102 (45.9)	109 (49.1)	11 (5.0)	**< 0.001**

Table 3. Prostate biopsy results and PI-RADS scores from external and study center MRI exams.

PI-RADS	Center	Cases, n (%)	No PCa n (%)	GG 1 n (%)	GG 2 n (%)	GG 3 n (%)	GG 4 n (%)	GG 5 n (%)
1	External centers	0	0	0	0	0	0	0
	Study center	0	0	0	0	0	0	0
2	External centers	4 (1.8)	0 (0)	0 (0)	3 (75.0)	0 (0)	0 (0)	1 (25.0)
	Study center	64 (28.8)	49 (76.6)	10 (15.6)	2 (3.1)	1 (1.6)	1 (1.6)	1 (1.6)
3	External centers	26 (11.7)	13 (50)	5 (19.2)	6 (23.1)	0 (0)	2 (7.2)	0 (0)
	Study center	44 (19.8)	17 (38.6)	16 (36.4)	9 (20.5)	2 (4.5)	0 (0)	0 (0)
4	External centers	149 (67.1)	52 (34.9)	26 (17.4)	43 (28.9)	19 (12.8)	7 (4.7)	2 (1.3)
	Study center	73 (32.9)	3 (4.1)	5 (6.8)	41 (56.2)	15 (20.5)	8 (11.0)	1 (1.4)
5	External centers	43 (19.4)	5 (11.6)	3 (7.0)	13 (30.2)	12 (27.9)	3 (7.0)	7 (16.3)
	Study center	41 (18.5)	1 (2.4)	3 (7.3)	13 (31.7)	13 (31.7)	3 (7.3)	8 (19.5)
All	All	222 (100)	70 (31.5)	34 (15.3)	65 (29.3)	31 (14.0)	12 (5.4)	10 (4.5)

PI-RADS =prostate imaging-report and data system; PCa =prostate cancer; GG = ISUP grade group significant PCa

Table 4. Analysis of biopsy approaches affecting csPCa detection and iPCa over-detection.

Parameter	Strategy for Prostate biopsy:			p Value
	All referred men	Only referred PI-RADS $\geq$ 3	Only study center PI-RADS $\geq$ 3	
Prostate biopsies, n (%)	222 (100)	↓ 4 (1.8)	↓ 64 (28.8)	**= 0.021**
csPCa detection, n (%)	118 (53.2)	↓ 4 (3.4)	↓ 5 (4.2)	= 0.669
iPCa over-detection, n (%)	34 (15.3)	↓ 0 (0)	↓ 10 (29.4)	**= 0.034**

csPCa =clinically significant prostate cancer; iPCa =insignificant prostate cancer; PI-RADS =prostate imaging-report and data system

Table 5. Univariate and multivariate analysis of variables predicting PI-RADS score correspondence across different centers.

	Univariate analysis		Multivariate analysis	
	Odd ratio (95% CI)	**p Value**	**Odd ratio (95% CI)**	**p Value**
Age, Ref. ≤68 years	1.997 (1.167-3.418)	**=0.011**	2.171 (0.960-4.913)	=0.063
PCa family history, Ref. no	0.975 (0.446-2.131)	=0.950	0.776 (0.283-2.132)	=0.623
Previous negative prostate biopsy, Ref. no	1.003 (0.491-2.048)	=0.993	0.761 (0.310-1.886)	=0.551
Serum PSA, Ref. ≤6.8 ng/ml	2.497 (1.455-4.287)	<0.001	1.703 (0.789-3.677)	=0.175
Digital rectal examination, Ref. normal	3.088 (1.265-7.533)	**=0.010**	2.623 (0.868-7.929)	=0.088
Prostate volume, Ref. ≤47 cc	0.371 (0.216-0.638)	**<0.001**	0.359 (0.162-0.795)	**=0.012**
mpMRI, Ref. PI-RADS ≤3	3.052 (1.295-7.194)	**=0.008**	3.925 (1.888-8.160)	**<0.001**
Number of suspicious lesions, Ref. one	2.785 (1.451-5.346)	**=0.002**	1.703 (0.792-3.662)	=0.173
Largest diameter of index lesion, Ref. ≤11 mm	2.596 (1.509-4.464)	**<0.001**	1.122 (0.496-2.539)	=0.783
Central zone location of index lesion, Ref. no	0.549 (0.300-1.006)	=0.051	0.606 (0.243-1.514)	=0.284
Apical zone location of index lesion, Ref. no	1.705 (0.950-3.060)	=0.073	1.559 (0.680-3.569)	=0.294

PCa =prostate cancer; PSA =Prostate specific antigen; mpMRI =multiparametric magnetic resonance imaging.

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PI-RADS reported at external centers, n (%)	PI-RADS reported at the study center, n (%)					
	1	**2**	**3**	**4**	**5**	**All**
1	**0**	0	0	0	0	0 (0)
2	0	**0**	0	3	1	4 (1.8)
3	0	14	**8**	3	1	26 (11.7)
4	0	47	34	**65**	3	149 (67.1)
5	0	3	2	2	**36**	43 (19.4)
All	0	64 (28.8)	44 (19.8)	73 (32.9)	41 (18.5)	**222 (100)**

Concordance between PI-RADS =109/222 (49.1%); Kappa index =0.288; p <0.001

Figure 1. Correlation between the PI-RADS score in the index lesion reported in the mpMRI performed at external centers, and the PI-RADS reported by an experienced radiologist in the pre-biopsy bpMRI performed at the study center.

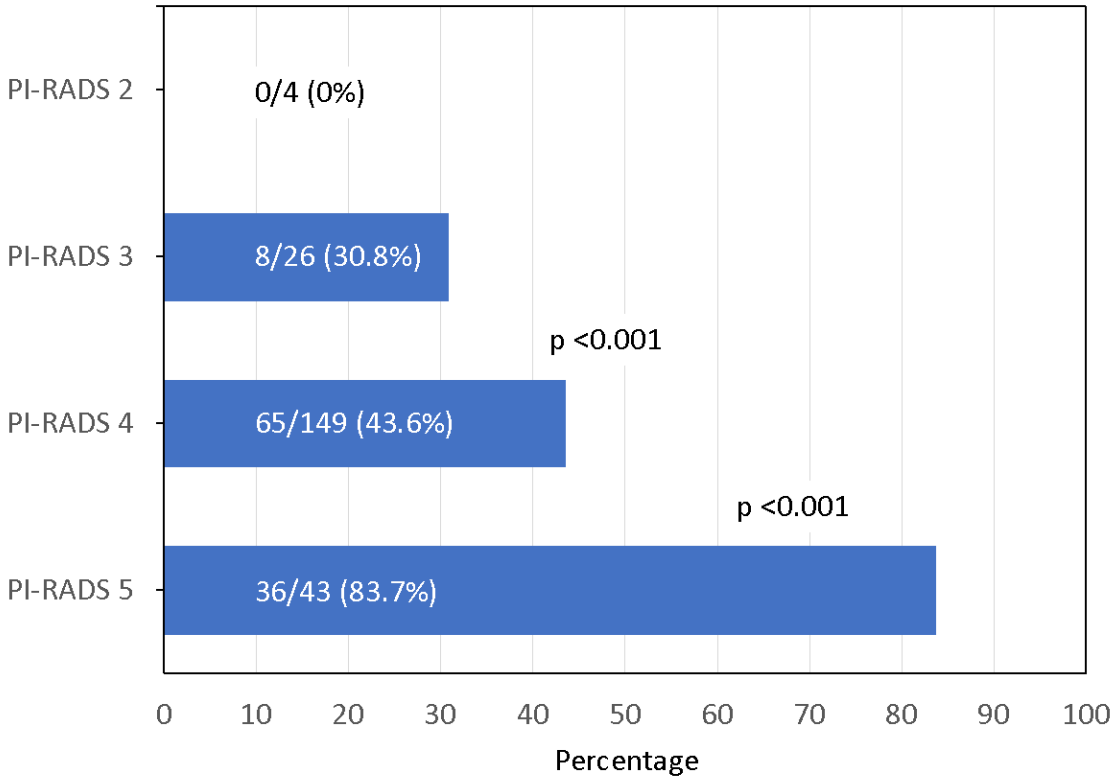

Figure 2. Concordance degree between the PI-RADS score reported in the index lesion of mpMRI performed at external centers and that reported at the study center, according to the referred PI-RADS.

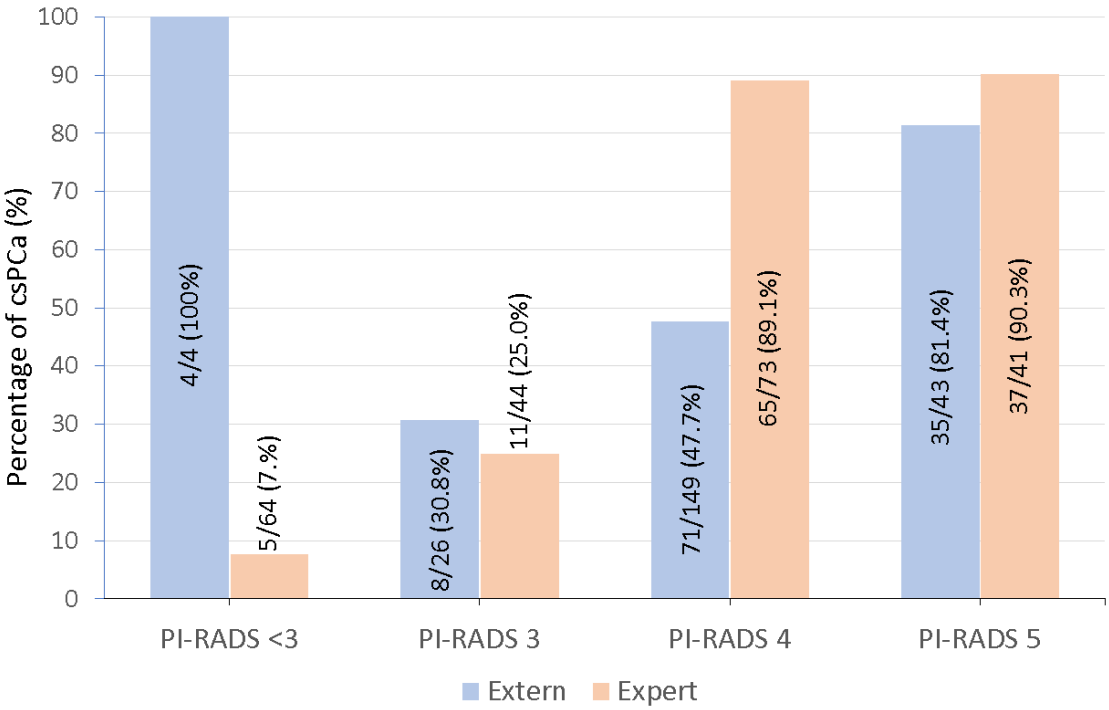

Figure 3. CsPCa detection according to the PI-RADS reported at external centers and study center.

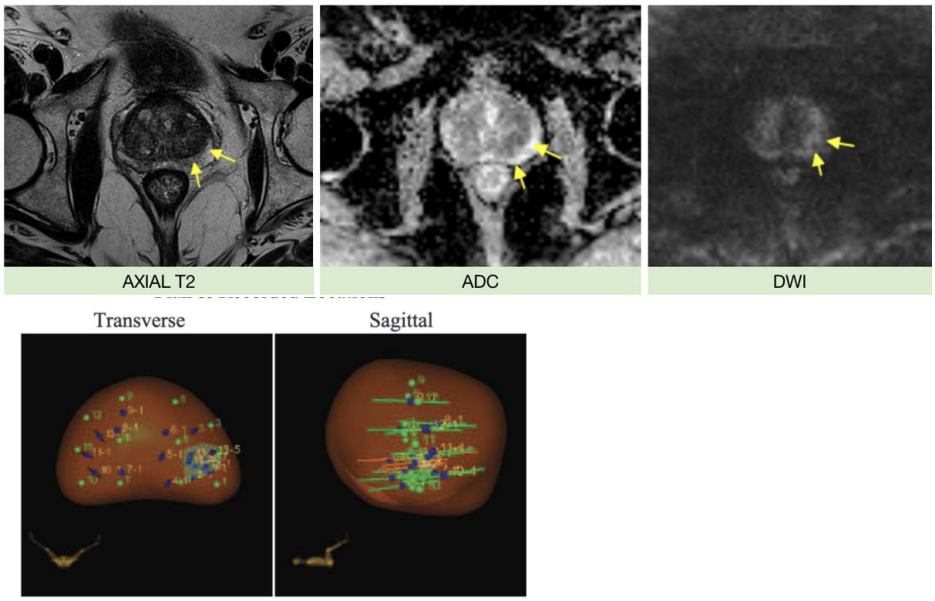

Figure 4. A) **External Center Report:** A 14 mm lenticular-shaped area located in the transition zone, left lobe, mid-region, posterior segment, shows signal hypointensity on T2-weighted sequences and diffusion restriction, consistent with PIRADS 4.

Study Center Report: An area of hypointensity on T2-weighted sequences is found within a nodule, with mild restriction similar to the adjacent transition zone, which is therefore recategorized as PIRADS 2. **Biopsy result:** Negative for malignant prostate neoplasia in both systematic biopsies and Target biopsy.

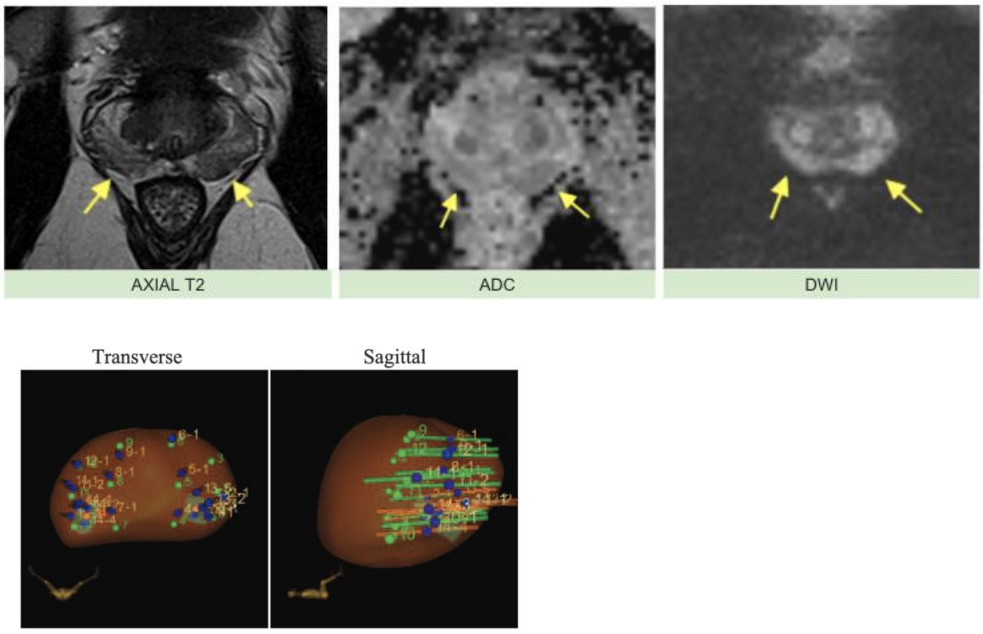

Figure 4. B) **External Center Report:** A 10 mm area located in the peripheral zone, left lobe, mid-region, posteromedial segment, showing signal hypointensity on T2-weighted sequences and marked diffusion restriction, consistent with PIRADS 4; an 8 mm lesion with similar characteristics in the peripheral zone, right lobe, mid-region, posteromedial segment. **Study Center Report:** An area of signal hypointensity on T2-weighted sequences with linear margins, showing mild restriction on diffusion sequences, findings suggestive of prostatitis, recategorized to PIRADS 2. **Biopsy result:** Negative for malignant prostate neoplasia in both systematic biopsies and Target biopsy.

Relevance in Clinical Practice

Patient Summary: The experience of radiologists plays a crucial role in accurately interpreting magnetic resonance imaging (MRI) findings and categorizing lesions based on PI-RADS scores. Expert reading of bpMRI improves the early detection of csPCa compared with non-expert reading of mpMRI.

What the Study Adds: The study highlights the clinical importance of expert bpMRI readings in guiding patient management decisions. By reducing unnecessary biopsies without compromising csPCa detection rates, expert interpretation of bpMRI offers potential benefits in optimizing resource utilization and minimizing unnecessary biopsies.

Micro-abstract:

This study analyzes the concordance between non-expert radiologists' readings of multiparametric MRI (mpMRI) and expert readings of biparametric MRI (bpMRI) in the detection of clinically significant prostate cancer. A low concordance (49.1%) was found, with expert reclassification potentially reducing prostate biopsies by 27% and the over-detection of insignificant cancers, without compromising the detection of clinically significant cancers.

Concordance Between the Expert Reading of Biparametric-MRI and the Non-Expert Multiparametric-MRI for the Detection of Clinically Significant Prostate Cancer: Clinical Implications.

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Abstract

Purpose: Prostate-magnetic resonance imaging (MRI) interpretation is challenging, with expertise playing a crucial role. Biparametric MRI (bpMRI) is gaining popularity in experienced centers due to its time and cost advantages over multiparametric MRI (mpMRI). We aim to analyze concordance between non-expert radiologist PI-RADS from mpMRI and expert radiologist PI-RADS from bpMRI, and its clinical implications.

Material and Methods: 222 men suspected of having prostate cancer (PCa) and mpMRI reported by non-expert radiologists were referred to a reference center for transperineal MRI-TRUS fusion biopsy where an expert radiologist reported bpMRI PI-RADS 2.1 and segmentation, blinded to external mpMRI. Mapping targeted suspected lesions and 12-core systematic biopsies were performed. Clinically significant PCa (csPCa) was diagnosed when ISUP-grade group was ≥2.

Results: Concordance between both PI-RADS existed in 49.1% of cases (Kappa index 0.288). In 102 cases (45.9%), expert reclassification to lower PI-RADS existed, while an increase existed in 11 cases (5.0%), p <0.001. Agreement existed in 30.8% of non-expert PI-RADS 3, 43.6% of PI-RADS 4, and 83.7% of PI-RADS 5, p <0.001. Potential clinical implications included 27% reduction in prostate biopsies when using expert bpMRI readings compared to non-expert mpMRI readings (p < 0.001), while undetected csPCa were 4.2% and 3.4%, respectively, p =0.669. Over-detection reduction of insignificant PCa was 29.4% and 0%, respectively, p =0.034.

Conclusions: Concordance between non-expert PI-RADS mpMRI and expert PI-RADS bpMRI was low, increasing with non-expert PI-RADS. Expert reclassification would reduce prostate biopsies by more than one quarter and over-detection of iPCa, while csPCa detection remained similar.

WC: 250

Key Words: Prostatic neoplasms. Diagnostic imaging. Biopsy.

1. Introduction.

Prostate cancer (PCa) is the most common malignancy and the third leading cause of cancer mortality in men in the United States and European Union (1). In 2020, about 1.4 million men worldwide were diagnosed with PCa, representing 15% of male cancers (2,3). The suspicion of PCa remains based on the serum measurement of prostate-specific antigen (PSA) level and digital rectal examination (DRE); diagnosis requires a prostate biopsy (4). Screening is contentious due to excessive biopsies and the over-detection of insignificant tumors (iPCa), leading to over-treatment (5).

Clinically significant Prostate cancer (csPCa) is commonly defined as Gleason pattern 3+4 or higher, equivalent to grade groups 2 to 5 by the International Society of Urologic Pathology (ISUP) (6).

Recent advancements propose complementary tools to reduce unnecessary biopsies and over-detection of iPCa, including new molecular markers, predictive models, and classic PSA density. However, the most significant progress in early csPCa detection has come from prostate magnetic resonance imaging (MRI) and targeted biopsies of suspicious areas (7). The evolution of multiparametric MRI techniques (mpMRI) and overall improvement in interpretation through the Prostate Imaging-Report and Data System (PI-RADS) have been essential to identifying the semi-quantitative risk of csPCa in suspicious areas (8).

Dynamic contrast-enhanced (DCE) MRI has a limited role in PI-RADS categorization, primarily enhancing peripheral zone findings with a diffusion-weighted image (DWI) score of 3. For improved visibility of csPCa, multiparametric MRI (mpMRI) is preferred, aiding in focal therapy planning and active surveillance (9). However, DCE-MRI with gadolinium chelate raises concerns due to potential gadolinium retention, nephrogenic systemic fibrosis risk, longer examination time, and higher costs (10,11). Interest is growing in abbreviated prostate MRI protocols without DCE-MRI, known as biparametric MRI (bpMRI). Several studies using PI-RADS v2 report that the diagnostic accuracy of bpMRI for detecting csPCa is comparable to that of mpMRI (12,13).

These innovations and PI-RADS score evolution for categorizing prostate lesions, ranging from very low to high csPCa suspicion, led to software development merging MRI findings with real-time transrectal ultrasound (TRUS) images (14).

Inter-reader MRI variability and radiologist experience are variables that determine the correct detection of csPCa. The literature lacks a single definition of an expert radiologist, with criteria ranging from a minimum of 1000 cases or three years in prostate imaging to board-certified uro-radiologists with 5 to 12 years of prostate MRI experience (15-17).

Our main objective is to analyze the concordance degree of PI-RADS scores of index lesions reported from the non-expert mpMRI and the expert bpMRI reading, in men suspected of having PCa undergoing transperineal MRI-TRUS fusion and systematic prostate biopsies. Secondarily, we aim to assess the influence of the concordance degree on the number of biopsies needed, and the rates of csPCa detection and iPCa over-detection. Additionally, we aim to assess predictive factors influencing the concordance degree between both PI-RADS categories.

2. Material and methods

2.1 Design, Setting, and Participants

This retrospective analysis was based on the first-year prospective trial validating Barcelona risk calculators for detecting csPCa (18,19) at Creu Blanca Clinic, Barcelona, Spain—a specialized center for transperineal MRI-TRUS fusion prostate biopsy. From January 1 to December 31, 2022, 222 men with suspected PCa (PSA >3.0 ng/mL and/or abnormal DRE) were referred for biopsy based on mpMRI findings interpreted by general radiologists. A pre-biopsy bpMRI, segmented and classified on PI-RADS v2.1, was performed independently of external mpMRI. The study adhered to START guidelines (20), used anonymized data, and received Vall d'Hebron Ethics Committee approval (PRAG-02/2021), supported by Instituto de Salut Carlos III of Spain (PI20/01666).

2.2. Intervention

To Analyze the concordance between PI-RADS scores from general radiologist-reported mpMRI at the index lesion and experienced radiologist-reported pre-biopsy bpMRI for lesion segmentation and PI-RADS v.2.1 reclassification. Evaluate potential clinical implications of this reclassification.

2.3. MRI Image Acquisition Data and Segmentation

The pre-biopsy bpMRI at Creu Blanca Clinic used a Siemens Verio™ 3 Tesla MRI Scanner with a pelvic-phased array. The protocol comprised TSG-SET2 transversal sections, coronal and sagittal TSET2 sequences (2D and 3D), DWI (b-values: 1600-2000-3000 s/mm²), and ADC mapping. An experienced uro-radiologist, with 15+ years and 1,500+ annual MRI readings, reclassified external mpMRI lesions using PI-RADS v2.1 based on bpMRI for segmentation (21). The ProFuse™ system aided semi-automatic segmentation of up to three suspicious lesions, meeting European Society of Urogenital Radiology criteria (22). Men with suspected PCa and lesions reclassified to PI-RADS score 2 underwent the same biopsy protocol as those who had targeted and systematic biopsies. The Prostate Imaging Quality (PI-QUAL) scores of the external mpMRI were of sufficient diagnostic quality, scoring ≥3 (23,24).

2.4. Transperineal prostate biopsy

Prostate biopsies were performed transperineally in the lithotomy position under general anesthesia by four experienced urologists. MRI-TRUS image fusion was performed with the ARTEMIS™ robotic system (Eigen, California, USA). Core biopsy samples were obtained using the BARD Magnum™ gun with 18-gauge x 20-cm prostate biopsy needles (Bard Care, Crawley, UK) under ultrasound vision (HITACHI ALOKA NOBLUS™, HITACHI, Connecticut, USA).

The biopsy protocol included mapping-targeted biopsies, obtaining a maximum of three samples from suspicious areas through 0.5-mm mapping per lesion and perilesional region. A subsequent systematic biopsy, following the ARTEMIS™ platform scheme, comprised 12 cores, excluding suspicious areas. Systematic biopsy cores were individually numbered as independent samples (1 to 12), while cores from suspicious areas were grouped as samples 13 to 15.

2.5. Histopathological diagnosis

A urologic pathologist with over 10 years of prostatic pathology experience analyzed the material. The pathology report included the number of positive cores, tumor length, and the International Society of Urologic Pathology (ISUP) grade group. CsPCa was defined as ISUP-GG 2 or higher (6,25).

2.6. Available variables for the study

Age, family history of PCa (first degree), biopsy type (initial vs. repeated), DRE result (normal vs. suspicious), DRE prostate volume category (small, medium, large), PSA level (ng/mL), MRI prostate volume, number of suspicious areas, external PI-RADS score, expert PI-RADS v2.1 score, maximum lesion diameter (mm), lesion site (right vs. left), and location (peripheral base-center, peripheral apex, central-transition zone, or anterior zone). Pathology findings covered ISUP grade group, length per affected core, total core count, and positive samples categorized by location in systematic and mapping-targeted biopsies.

2.7 Endpoint variables of the study

The main endpoint variable of this study was the reclassification of PI-RADS score. Additionally, we examined the hypothetical decrease of prostate biopsies, the impact on detecting csPCa, and the potential over-detection of iPCa.

2.8. Statistical analysis

Quantitative variables were presented as medians and interquartile ranges (IQR: 25th–75th percentile), while qualitative variables were expressed as percentages. Pearson's chi-square test assessed the association among qualitative variables. Concordance between PI-RADS categories from non-expert and expert MRI readings was evaluated using the Kappa index. Binary logistic regression identified independent predictive variables for concordance, providing odds ratios (OR) and 95% confidence intervals (95% CI). Significance was considered for p values < 0.05. Statistical analysis utilized SPSS v.25 (IBM Corp., Armonk, NY, USA).

3. Results

The characteristics of the 222 men included in this study are shown in **Table 1**. The median age at biopsy was 67 years (IQR: 61-72) with a median serum PSA level of 6.8 ng/ml (IQR: 5.0-9.2). The median prostate volume, as reported from MRI, was 47 cc. (IQR: 35-65). In 29 men (13.6%), a family history of PCa existed, and 40 men (18.8%) had undergone at least one previous negative biopsy. DRE was suspicious in 24 men (11.3%). In 169 cases, only one suspicious lesion existed (76.1%), in 43 (19.4%) two, and in 10 cases, three (4.5%). PI-RADS score reported from the external mpMRI of the index lesion was 2 in 4 men (1.8%), 3 in 26 (11,7 %), 4 in 149 (67.1%) and 5 in 43 (19.4%). The median cores obtained for each patient was 21 (IQR: 19-24). In total, 152 (68.5%) patients have been diagnosed with PCa, of which 118 (53.2%) were csPCa and 34 (15.3%) were iPCa.

When considering the correlation between PI-RADS scores for index lesions reported by general radiologists in mpMRI conducted at external centers and those reported by an experienced radiologist in pre-biopsy bpMRI at the study center, we observed concurrence in 109 cases (49.1%) with a Kappa index of 0.288, **Figure 1**. Overall, in 102 cases (45.9%), experienced radiologists reduced the PI-RADS score, while in 11 (5.0%) increased the PI-RADS score ($p < 0.001$). Correlation between expert and non-expert reading according to the non-expert PI-RADS is summarized in **Table 2**. Concordance between non-expert and expert reading was greater as the PI-RADS score increased. It was 30.8% in PI-RADS 3, 43.6% in PI-RADS 4 and 83.7% in PI-RADS 5, **Figure 2**.

Characteristics of the relationship between the histopathological results corresponding to the index lesion biopsies and the PI-RADS score of the MRIs read in the study center and external centers are detailed in **Table 3**. Of the 64 men with an index lesion categorized by the expert center as PIRADS 2, 49 men (76.6%) did not have PCa and 10 (15.6%) were diagnosed with GG1 PCa. The over-detection of iPCa was lower with expert reading in suspected PI-RADS 4 lesions, while no differences were found between both readings in PI-RADS 5 lesions. Detection of csPCa increased along with increasing PI-RADS score in expert readings. In contrast, this correlation was not observed in the evaluations performed by general radiologists. Following expert criteria, 64 (28.8%) suspicious images reported by external centers as PI-RADS score ≥ 3 were lowered to PI-RADS category 2. Considering that prostate biopsy could be avoided in men with PI-RADS < 3, expert reading could have avoided 28.8% of prostate biopsies while reading by general radiologists could have avoided 4 biopsies (1.8%), $p = 0.021$. If they had not been biopsied, 5 (4.2%) of csPCa would have been missed by the expert reading compared to 4 (3.4%) by non-expert reading, $p = 0.669$. Regarding the over-detection of iPCa, the reclassification of PI-RADS by expert reading would reduce the detection of 10 (29.4%) iPCa while none by non-expert reading, $p = 0.034$, **Table 4**. The four men (100%) in whom non-expert reading suggested as PIRADS 2, had aggressive PCa, in three an ISUP grade group 2 was found and 5 in one, **Figure 3**. An example of the disagreement between expert and non-expert readings is shown in **Figure 4**.

The multivariate analysis conducted using the available variables in this study revealed that the non-expert PI-RADS score, and prostate volume independently predicted the concordance between non-expert and expert PI-RADS, **Table 5**. Specifically, the level of concordance increased with the rise of the non-

expert PI-RADS, OR 3.925 (95% CI 1.888-8.160), $p < 0.001$. Concerning prostate volume, concordance increased as its volume decreased, OR 0.359 (95% CI 0.162-0.795), $p = 0.012$. A notable impact of prostate volume on concordance was observed exclusively in non-expert PI-RADS 4, with no significant influence in PI-RADS 3 and 5.

4. Discussion

Expertise in prostate MRI interpretation lacks a standardized definition. Some suggest a radiologist becomes experienced after interpreting at least 500 cases, while others set the threshold at 1000 cases (15, 26). Alternatively, experience may be measured in years, with three, five, or twelve years in prostate imaging considered as experienced (13,16). Histopathological feedback and case volume are crucial for expertise (27).

There is a notable absence of studies comparing non-expert mpMRI reading with expert bpMRI reading, especially with PIRADS v2.1. Our study aimed at investigating the concordance degree between both non-expert reading using mpMRI and the reclassification of lesions through expert reading using bpMRI. We also aimed to understand the impact of different readings on the detection of csPCa. Literature recognizes bpMRI for its speed, cost-effectiveness, and security, prompting our interest in evaluating expert reading in bpMRI (28, 29).

We observed agreement between expert and non-expert report of PI-RADS score of index lesions readings in less than half of cases (49.1%) with a low grade of concordance. Consistent with our results, other studies have reported fair agreement between readers and differences among radiologists in lesion characterization (29, 30, 31). Gatti et al. emphasized the importance of reader experience in assessing bpMRI, aligning with our results (15). Among 64 men with lesions recategorized by the expert reading with bpMRI as PIRADS 2, 49 patients (76.6%) did not have PCa, and 10 (15.6%) were diagnosed with GG1 PCa. In a recent study, results paralleled ours in terms of expert reading. Out of 116 index lesions, 45 were reclassified with a PI-RADS score 2 or less, exempting them from prostate biopsy. The study also highlighted discrepancies between non-expert and expert readings, corroborating our findings (32). Notably, all men with a reclassified PI-RADS score of 2 underwent prostate biopsy, with a low csPCa rate (4.2%), and those with an external PI-RADS score of 2 were reclassified to higher PI-RADS, all having csPCa (100%). The detection of csPCa increased with rising PI-RADS scores in expert readings, contrary to assessments by general radiologists. This contradicts findings by Boschheidgen et al, who reported increased csPCa detection with higher PI-RADS scores in both readings (31). Kang et al. and Soon et al. also reported correlations between higher Likert scores or PI-RADS scores and increased csPCa detection, especially in experienced group readings (29, 33).

Improving reader experience significantly reduces the tendency to over-detect iPCa. Boschheidgen et al. conducted a study comparing readings from experts and non-experts in prostate MRI imaging for 45-year-old men, revealing a 71% reduction in iPCa detection when using PI-RADS ≥ 4 as the biopsy threshold (31).

In the context of prostate volume, it becomes evident that prostate size influences the accuracy of non-expert readings. Gatti et al. reported that in cases of PI-RADS 4, smaller prostatic volumes were associated with undetected lesions among readers with intermediate experience (young radiologists with 300 cases). The cancer detection rate significantly decreases in small and heterogeneous prostates, emphasizing the impact of experience on accurate readings (15).

Based on the criteria of avoiding prostate biopsy when PI-RADS category is less than three (4), expert reading reduced the need for prostate biopsies by 28.8%, compared to 1.8% with non-expert reading of mpMRI. This aligns with findings by Boschheidgen et al. who observed a 20% reduction in biopsies for PI-RADS 3–5 in expert reading (31).

The PI-RADS v. 2.1 reading model can be applied without the use of contrast for PI-RADS 3 lesions in the peripheral zone, as the dominant sequence in this region is the diffusion-weighted sequence. Contrast material is only relevant for a potential upgrade to PI-RADS 4 in those PI-RADS 3 lesions that show enhancement after contrast administration. For this reason, in our study, there might be a higher proportion of PI-RADS 3 lesions in the expert interpretation using bpMRI (34,35).

To our knowledge, this is the first study comparing non-expert mpMRI reading with expert bpMRI reading using PI-RADS V 2.1. We assess the clinical impact by comparing with histopathological results. A strength is the blind reporting of bpMRI by an expert without prior exposure to mpMRI. Limitations include a retrospective, single-center design with a limited patient cohort. The absence of intravenous contrast may impact lesion upgrading, affecting biopsy considerations for PI-RADS 4 or higher lesions. The high expertise of our radiologists may limit study reproducibility.

Further studies are warranted to assess the agreement between expert and non-expert radiologists in reading bpMRI, validate bpMRI, and understand the clinical impact of reducing biopsies through expert bpMRI reading. Additionally, investigations should explore whether a bpMRI without contrast, coupled with expert reading, suffices in a pre-biopsy setting.

5. Conclusion

Concordance between non-expert PI-RADS mpMRI and expert PI-RADS bpMRI was low and it increased as the PI-RADS mpMRI score was higher. The reclassification of PI-RADS category with expert reading would reduce the need of prostate biopsies more than one quarter, without reducing csPCa detection, and decreasing the over-detection of iPCa.

WC: 2511

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Concordance Between the Expert Reading of Biparametric-MRI and the Non-Expert Multiparametric-MRI for the Detection of Clinically Significant Prostate Cancer: Clinical Implications.

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Abstract

Purpose: Prostate-magnetic resonance imaging (MRI) interpretation is challenging, with expertise playing a crucial role. Biparametric MRI (bpMRI) is gaining popularity in experienced centers due to its time and cost advantages over multiparametric MRI (mpMRI). We aim to analyze concordance between non-expert radiologist PI-RADS from mpMRI and expert radiologist PI-RADS from bpMRI, and its clinical implications.

Material and Methods: 222 men suspected of having prostate cancer (PCa) and mpMRI reported by non-expert radiologists were referred to a reference center for transperineal MRI-TRUS fusion biopsy where an expert radiologist reported bpMRI PI-RADS 2.1 and segmentation, blinded to external mpMRI. Mapping targeted suspected lesions and 12-core systematic biopsies were performed. Clinically significant PCa (csPCa) was diagnosed when ISUP-grade group was ≥2.

Results: Concordance between both PI-RADS existed in 49.1% of cases (Kappa index 0.288). In 102 cases (45.9%), expert reclassification to lower PI-RADS existed, while an increase existed in 11 cases (5.0%), p <0.001. Agreement existed in 30.8% of non-expert PI-RADS 3, 43.6% of PI-RADS 4, and 83.7% of PI-RADS 5, p <0.001. Potential clinical implications included 27% reduction in prostate biopsies when using expert bpMRI readings compared to non-expert mpMRI readings (p < 0.001), while undetected csPCa were 4.2% and 3.4%, respectively, p =0.669. Over-detection reduction of insignificant PCa was 29.4% and 0%, respectively, p =0.034.

Conclusions: Concordance between non-expert PI-RADS mpMRI and expert PI-RADS bpMRI was low, increasing with non-expert PI-RADS. Expert reclassification would reduce prostate biopsies by more than one quarter and over-detection of iPCa, while csPCa detection remained similar.

WC: 250

Key Words: Prostatic neoplasms. Diagnostic imaging. Biopsy.

1. Introduction.

Prostate cancer (PCa) is the most common malignancy and the third leading cause of cancer mortality in men in the United States and European Union (1). In 2020, about 1.4 million men worldwide were diagnosed with PCa, representing 15% of male cancers (2,3). The suspicion of PCa remains based on the serum measurement of prostate-specific antigen (PSA) level and digital rectal examination (DRE); diagnosis requires a prostate biopsy (4). Screening is contentious due to excessive biopsies and the over-detection of insignificant tumors (iPCa), leading to over-treatment (5).

Clinically significant Prostate cancer (csPCa) is commonly defined as Gleason pattern 3+4 or higher, equivalent to grade groups 2 to 5 by the International Society of Urologic Pathology (ISUP) (6).

Recent advancements propose complementary tools to reduce unnecessary biopsies and over-detection of iPCa, including new molecular markers, predictive models, and classic PSA density. However, the most significant progress in early csPCa detection has come from prostate magnetic resonance imaging (MRI) and targeted biopsies of suspicious areas (7). The evolution of multiparametric MRI techniques (mpMRI) and overall improvement in interpretation through the Prostate Imaging-Report and Data System (PI-RADS) have been essential to identifying the semi-quantitative risk of csPCa in suspicious areas (8).

Dynamic contrast-enhanced (DCE) MRI has a limited role in PI-RADS categorization, primarily enhancing peripheral zone findings with a diffusion-weighted image (DWI) score of 3. For improved visibility of csPCa, multiparametric MRI (mpMRI) is preferred, aiding in focal therapy planning and active surveillance (9). However, DCE-MRI with gadolinium chelate raises concerns due to potential gadolinium retention, nephrogenic systemic fibrosis risk, longer examination time, and higher costs (10,11). Interest is growing in abbreviated prostate MRI protocols without DCE-MRI, known as biparametric MRI (bpMRI). Several studies using PI-RADS v2 report that the diagnostic accuracy of bpMRI for detecting csPCa is comparable to that of mpMRI (12,13).

These innovations and PI-RADS score evolution for categorizing prostate lesions, ranging from very low to high csPCa suspicion, led to software development merging MRI findings with real-time transrectal ultrasound (TRUS) images (14).

Inter-reader MRI variability and radiologist experience are variables that determine the correct detection of csPCa. The literature lacks a single definition of an expert radiologist, with criteria ranging from a minimum of 1000 cases or three years in prostate imaging to board-certified uro-radiologists with 5 to 12 years of prostate MRI experience (15-17).

Our main objective is to analyze the concordance degree of PI-RADS scores of index lesions reported from the non-expert mpMRI and the expert bpMRI reading, in men suspected of having PCa undergoing transperineal MRI-TRUS fusion and systematic prostate biopsies. Secondarily, we aim to assess the influence of the concordance degree on the number of biopsies needed, and the rates of csPCa detection and iPCa over-detection. Additionally, we aim to assess predictive factors influencing the concordance degree between both PI-RADS categories.

2. Material and methods

2.1 Design, Setting, and Participants

This retrospective analysis was based on the first-year prospective trial validating Barcelona risk calculators for detecting csPCa (18,19) at Creu Blanca Clinic, Barcelona, Spain—a specialized center for transperineal MRI-TRUS fusion prostate biopsy. From January 1 to December 31, 2022, 222 men with suspected PCa (PSA >3.0 ng/mL and/or abnormal DRE) were referred for biopsy based on mpMRI findings interpreted by general radiologists. A pre-biopsy bpMRI, segmented and classified on PI-RADS v2.1, was performed independently of external mpMRI. The study adhered to START guidelines (20), used anonymized data, and received Vall d'Hebron Ethics Committee approval (PRAG-02/2021), supported by Instituto de Salut Carlos III of Spain (PI20/01666).

2.2. Intervention

To Analyze the concordance between PI-RADS scores from general radiologist-reported mpMRI at the index lesion and experienced radiologist-reported pre-biopsy bpMRI for lesion segmentation and PI-RADS v.2.1 reclassification. Evaluate potential clinical implications of this reclassification.

2.3. MRI Image Acquisition Data and Segmentation

The pre-biopsy bpMRI at Creu Blanca Clinic used a Siemens Verio™ 3 Tesla MRI Scanner with a pelvic-phased array. The protocol comprised TSG-SET2 transversal sections, coronal and sagittal TSET2 sequences (2D and 3D), DWI (b-values: 1600-2000-3000 s/mm²), and ADC mapping. An experienced uro-radiologist, with 15+ years and 1,500+ annual MRI readings, reclassified external mpMRI lesions using PI-RADS v2.1 based on bpMRI for segmentation (21). The ProFuse™ system aided semi-automatic segmentation of up to three suspicious lesions, meeting European Society of Urogenital Radiology criteria (22). Men with suspected PCa and lesions reclassified to PI-RADS score 2 underwent the same biopsy protocol as those who had targeted and systematic biopsies. The Prostate Imaging Quality (PI-QUAL) scores of the external mpMRI were of sufficient diagnostic quality, scoring ≥3 (23,24).

2.4. Transperineal prostate biopsy

Prostate biopsies were performed transperineally in the lithotomy position under general anesthesia by four experienced urologists. MRI-TRUS image fusion was performed with the ARTEMIS™ robotic system (Eigen, California, USA). Core biopsy samples were obtained using the BARD Magnum™ gun with 18-gauge x 20-cm prostate biopsy needles (Bard Care, Crawley, UK) under ultrasound vision (HITACHI ALOKA NOBLUS™, HITACHI, Connecticut, USA).

The biopsy protocol included mapping-targeted biopsies, obtaining a maximum of three samples from suspicious areas through 0.5-mm mapping per lesion and perilesional region. A subsequent systematic biopsy, following the ARTEMIS™ platform scheme, comprised 12 cores, excluding suspicious areas. Systematic biopsy cores were individually numbered as independent samples (1 to 12), while cores from suspicious areas were grouped as samples 13 to 15.

2.5. Histopathological diagnosis

A urologic pathologist with over 10 years of prostatic pathology experience analyzed the material. The pathology report included the number of positive cores, tumor length, and the International Society of Urologic Pathology (ISUP) grade group. CsPCa was defined as ISUP-GG 2 or higher (6,25).

2.6. Available variables for the study

Age, family history of PCa (first degree), biopsy type (initial vs. repeated), DRE result (normal vs. suspicious), DRE prostate volume category (small, medium, large), PSA level (ng/mL), MRI prostate volume, number of suspicious areas, external PI-RADS score, expert PI-RADS v2.1 score, maximum lesion diameter (mm), lesion site (right vs. left), and location (peripheral base-center, peripheral apex, central-transition zone, or anterior zone). Pathology findings covered ISUP grade group, length per affected core, total core count, and positive samples categorized by location in systematic and mapping-targeted biopsies.

2.7 Endpoint variables of the study

The main endpoint variable of this study was the reclassification of PI-RADS score. Additionally, we examined the hypothetical decrease of prostate biopsies, the impact on detecting csPCa, and the potential over-detection of iPCa.

2.8. Statistical analysis

Quantitative variables were presented as medians and interquartile ranges (IQR: 25th–75th percentile), while qualitative variables were expressed as percentages. Pearson's chi-square test assessed the association among qualitative variables. Concordance between PI-RADS categories from non-expert and expert MRI readings was evaluated using the Kappa index. Binary logistic regression identified independent predictive variables for concordance, providing odds ratios (OR) and 95% confidence intervals (95% CI). Significance was considered for p values < 0.05. Statistical analysis utilized SPSS v.25 (IBM Corp., Armonk, NY, USA).

3. Results

The characteristics of the 222 men included in this study are shown in **Table 1**. The median age at biopsy was 67 years (IQR: 61-72) with a median serum PSA level of 6.8 ng/ml (IQR: 5.0-9.2). The median prostate volume, as reported from MRI, was 47 cc. (IQR: 35-65). In 29 men (13.6%), a family history of PCa existed, and 40 men (18.8%) had undergone at least one previous negative biopsy. DRE was suspicious in 24 men (11.3%). In 169 cases, only one suspicious lesion existed (76.1%), in 43 (19.4%) two, and in 10 cases, three (4.5%). PI-RADS score reported from the external mpMRI of the index lesion was 2 in 4 men (1.8%), 3 in 26 (11,7 %), 4 in 149 (67.1%) and 5 in 43 (19.4%). The median cores obtained for each patient was 21 (IQR: 19-24). In total, 152 (68.5%) patients have been diagnosed with PCa, of which 118 (53.2%) were csPCa and 34 (15.3%) were iPCa.

When considering the correlation between PI-RADS scores for index lesions reported by general radiologists in mpMRI conducted at external centers and those reported by an experienced radiologist in pre-biopsy bpMRI at the study center, we observed concurrence in 109 cases (49.1%) with a Kappa index of 0.288, **Figure 1**. Overall, in 102 cases (45.9%), experienced radiologists reduced the PI-RADS score, while in 11 (5.0%) increased the PI-RADS score ($p < 0.001$). Correlation between expert and non-expert reading according to the non-expert PI-RADS is summarized in **Table 2**. Concordance between non-expert and expert reading was greater as the PI-RADS score increased. It was 30.8% in PI-RADS 3, 43.6% in PI-RADS 4 and 83.7% in PI-RADS 5, **Figure 2**.

Characteristics of the relationship between the histopathological results corresponding to the index lesion biopsies and the PI-RADS score of the MRIs read in the study center and external centers are detailed in **Table 3**. Of the 64 men with an index lesion categorized by the expert center as PIRADS 2, 49 men (76.6%) did not have PCa and 10 (15.6%) were diagnosed with GG1 PCa. The over-detection of iPCa was lower with expert reading in suspected PI-RADS 4 lesions, while no differences were found between both readings in PI-RADS 5 lesions. Detection of csPCa increased along with increasing PI-RADS score in expert readings. In contrast, this correlation was not observed in the evaluations performed by general radiologists. Following expert criteria, 64 (28.8%) suspicious images reported by external centers as PI-RADS score ≥ 3 were lowered to PI-RADS category 2. Considering that prostate biopsy could be avoided in men with PI-RADS < 3, expert reading could have avoided 28.8% of prostate biopsies while reading by general radiologists could have avoided 4 biopsies (1.8%), $p = 0.021$. If they had not been biopsied, 5 (4.2%) of csPCa would have been missed by the expert reading compared to 4 (3.4%) by non-expert reading, $p = 0.669$. Regarding the over-detection of iPCa, the reclassification of PI-RADS by expert reading would reduce the detection of 10 (29.4%) iPCa while none by non-expert reading, $p = 0.034$, **Table 4**. The four men (100%) in whom non-expert reading suggested as PIRADS 2, had aggressive PCa, in three an ISUP grade group 2 was found and 5 in one, **Figure 3**. An example of the disagreement between expert and non-expert readings is shown in **Figure 4**.

The multivariate analysis conducted using the available variables in this study revealed that the non-expert PI-RADS score, and prostate volume independently predicted the concordance between non-expert and expert PI-RADS, **Table 5**. Specifically, the level of concordance increased with the rise of the non-

expert PI-RADS, OR 3.925 (95% CI 1.888-8.160), $p < 0.001$. Concerning prostate volume, concordance increased as its volume decreased, OR 0.359 (95% CI 0.162-0.795), $p = 0.012$. A notable impact of prostate volume on concordance was observed exclusively in non-expert PI-RADS 4, with no significant influence in PI-RADS 3 and 5.

4. Discussion

Expertise in prostate MRI interpretation lacks a standardized definition. Some suggest a radiologist becomes experienced after interpreting at least 500 cases, while others set the threshold at 1000 cases (15, 26). Alternatively, experience may be measured in years, with three, five, or twelve years in prostate imaging considered as experienced (13,16). Histopathological feedback and case volume are crucial for expertise (27).

There is a notable absence of studies comparing non-expert mpMRI reading with expert bpMRI reading, especially with PIRADS v2.1. Our study aimed at investigating the concordance degree between both non-expert reading using mpMRI and the reclassification of lesions through expert reading using bpMRI. We also aimed to understand the impact of different readings on the detection of csPCa. Literature recognizes bpMRI for its speed, cost-effectiveness, and security, prompting our interest in evaluating expert reading in bpMRI (28, 29).

We observed agreement between expert and non-expert report of PI-RADS score of index lesions readings in less than half of cases (49.1%) with a low grade of concordance. Consistent with our results, other studies have reported fair agreement between readers and differences among radiologists in lesion characterization (29, 30, 31). Gatti et al. emphasized the importance of reader experience in assessing bpMRI, aligning with our results (15). Among 64 men with lesions recategorized by the expert reading with bpMRI as PIRADS 2, 49 patients (76.6%) did not have PCa, and 10 (15.6%) were diagnosed with GG1 PCa. In a recent study, results paralleled ours in terms of expert reading. Out of 116 index lesions, 45 were reclassified with a PI-RADS score 2 or less, exempting them from prostate biopsy. The study also highlighted discrepancies between non-expert and expert readings, corroborating our findings (32). Notably, all men with a reclassified PI-RADS score of 2 underwent prostate biopsy, with a low csPCa rate (4.2%), and those with an external PI-RADS score of 2 were reclassified to higher PI-RADS, all having csPCa (100%). The detection of csPCa increased with rising PI-RADS scores in expert readings, contrary to assessments by general radiologists. This contradicts findings by Boschheidgen et al, who reported increased csPCa detection with higher PI-RADS scores in both readings (31). Kang et al. and Soon et al. also reported correlations between higher Likert scores or PI-RADS scores and increased csPCa detection, especially in experienced group readings (29, 33).

Improving reader experience significantly reduces the tendency to over-detect iPCa. Boschheidgen et al. conducted a study comparing readings from experts and non-experts in prostate MRI imaging for 45-year-old men, revealing a 71% reduction in iPCa detection when using PI-RADS ≥ 4 as the biopsy threshold (31).

In the context of prostate volume, it becomes evident that prostate size influences the accuracy of non-expert readings. Gatti et al. reported that in cases of PI-RADS 4, smaller prostatic volumes were associated with undetected lesions among readers with intermediate experience (young radiologists with 300 cases). The cancer detection rate significantly decreases in small and heterogeneous prostates, emphasizing the impact of experience on accurate readings (15).

Based on the criteria of avoiding prostate biopsy when PI-RADS category is less than three (4), expert reading reduced the need for prostate biopsies by 28.8%, compared to 1.8% with non-expert reading of mpMRI. This aligns with findings by Boschheidgen et al. who observed a 20% reduction in biopsies for PI-RADS 3–5 in expert reading (31).

The PI-RADS v. 2.1 reading model can be applied without the use of contrast for PI-RADS 3 lesions in the peripheral zone, as the dominant sequence in this region is the diffusion-weighted sequence. Contrast material is only relevant for a potential upgrade to PI-RADS 4 in those PI-RADS 3 lesions that show enhancement after contrast administration. For this reason, in our study, there might be a higher proportion of PI-RADS 3 lesions in the expert interpretation using bpMRI (34,35).

To our knowledge, this is the first study comparing non-expert mpMRI reading with expert bpMRI reading using PI-RADS V 2.1. We assess the clinical impact by comparing with histopathological results. A strength is the blind reporting of bpMRI by an expert without prior exposure to mpMRI. Limitations include a retrospective, single-center design with a limited patient cohort. The absence of intravenous contrast may impact lesion upgrading, affecting biopsy considerations for PI-RADS 4 or higher lesions. The high expertise of our radiologists may limit study reproducibility.

Further studies are warranted to assess the agreement between expert and non-expert radiologists in reading bpMRI, validate bpMRI, and understand the clinical impact of reducing biopsies through expert bpMRI reading. Additionally, investigations should explore whether a bpMRI without contrast, coupled with expert reading, suffices in a pre-biopsy setting.

5. Conclusion

Concordance between non-expert PI-RADS mpMRI and expert PI-RADS bpMRI was low and it increased as the PI-RADS mpMRI score was higher. The reclassification of PI-RADS category with expert reading would reduce the need of prostate biopsies more than one quarter, without reducing csPCa detection, and decreasing the over-detection of iPCa.

WC: 2511

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