

**Supplemental Digital Content, containing 2 figures and 3 tables.**

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**Supplementary Figure 1** Cross-tabulation of Grade group according to biopsy interpretation methods (multiparametric magnetic resonance imaging-integrated [A], combined [B], targeted [C], and systematic [D]) in comparison with radical prostatectomy

**A**

Gleason Group		Multiparametric magnetic resonance imaging-integrated biopsy					
		1	2	3	4	5	Sum
Radical prostatectomy	1	3 (3.9%)	4 (5.3%)	0 (0%)	0 (0%)	0 (0%)	7 (9.2%)
	2	7 (9.2%)	25 (32.9%)	1 (1.3%)	1 (1.3%)	0 (0%)	34 (44.7%)
	3	0 (0%)	6 (7.9%)	9 (11.8%)	2 (2.6%)	3 (3.9%)	20 (26.3%)
	4	0 (0%)	0 (0%)	4 (5.3%)	4 (5.3%)	0 (0%)	8 (10.5%)
	5	0 (0%)	1 (1.3%)	2 (2.6%)	1 (1.3%)	3 (3.9%)	7 (9.2%)
Sum		10 (13.1%)	36 (47.4%)	16 (21.1%)	8 (10.5%)	6 (7.9%)	76 (100%)

**B**

Gleason Group		Combined biopsy					
		1	2	3	4	5	Sum
Radical prostatectomy	1	3 (3.9%)	4 (5.3%)	0 (0%)	0 (0%)	0 (0%)	7 (9.2%)
	2	8 (10.5%)	17 (22.4%)	7 (9.2%)	2 (2.6%)	0 (0%)	34 (44.7%)
	3	0 (0%)	1 (1.3%)	11 (14.5%)	4 (5.3%)	4 (5.3%)	20 (26.3%)
	4	0 (0%)	0 (0%)	3 (3.9%)	4 (5.3%)	1 (1.3%)	8 (10.5%)
	5	0 (0%)	1 (1.3%)	0 (0%)	3 (3.9%)	3 (3.9%)	7 (9.2%)
Sum		11 (14.5%)	23 (30.3%)	21 (27.6%)	13 (17.1%)	8 (10.5%)	76 (100%)

**C**

Gleason Group		Targeted biopsy					
		1	2	3	4	5	Sum
Radical prostatectomy	1	3 (4.5%)	2 (3.0%)	0 (0%)	0 (0%)	0 (0%)	5 (7.5%)
	2	11 (16.4%)	16 (23.9%)	2 (3.0%)	1 (1.5%)	0 (0%)	30 (44.8%)
	3	2 (3.0%)	2 (3.0%)	8 (11.9%)	4 (6.0%)	1 (1.5%)	17 (25.4%)
	4	0 (0%)	1 (1.5%)	4 (6.0%)	3 (4.5%)	0 (0%)	8 (11.9%)
	5	0 (0%)	1 (1.5%)	2 (3.0%)	2 (3.0%)	2 (3.0%)	7 (10.5%)
Sum		16 (23.9%)	22 (32.8%)	16 (23.9%)	10 (14.9%)	3 (4.5%)	67 (100%)

**D**

Gleason Group		Systematic biopsy					
		1	2	3	4	5	Sum
Radical prostatectomy	1	4 (5.6%)	3 (4.2%)	0 (0%)	0 (0%)	0 (0%)	7 (9.9%)
	2	10 (14.1%)	12 (16.9%)	6 (8.5%)	2 (2.8%)	0 (0%)	30 (42.3%)
	3	0 (0%)	5 (7.0%)	8 (11.3%)	3 (4.2%)	4 (5.6%)	20 (28.2%)
	4	0 (0%)	0 (0%)	4 (5.6%)	2 (2.8%)	1 (1.4%)	7 (9.9%)
	5	1 (1.4%)	0 (0%)	0 (0%)	4 (5.6%)	2 (2.8%)	7 (9.9%)
Sum		15 (21.1%)	20 (28.2%)	18 (25.4%)	11 (15.5%)	7 (9.9%)	71 (100%)

Upgrading of Gleason Group in radical prostatectomy  
 Concordant Gleason Group in radical prostatectomy  
 Downgrading of Gleason Group in radical prostatectomy

**Supplementary Table 1** Comparison of patient characteristics according to the tumor laterality determined by the biopsy-integrated 3-D multiparametric magnetic resonance imaging model of prostate cancer

	<b>Unilateral disease (n=32)</b>	<b>Bilateral disease (n=51)</b>	<b>P value</b>
<b>Age (median, IQR)</b>	64 (60.8–69.3)	67 (62.0–70.0)	.76
<b>Prostate-specific antigen (median, IQR)</b>	6.5 (4.5–9.8)	7.8 (6.2–13.0)	<b>.009</b>
<b>Prostate volume (mL)<sup>a</sup></b>	33.5 (25–46.5)	31.0 (20.5–38.5)	.35
<b>Index tumor volume (mL)<sup>a</sup></b>	1.5 (1.1–1.8)	1.8 (0.9–2.1)	.15
<b>Index tumor diameter (mm)<sup>a</sup></b>	15.0 (13.8–18.0)	19.0 (12.5–24.0)	<b>.02</b>
<b>Region of interest (ROI) number</b>			.24 <sup>c</sup>
1	31/32 (96.9%)	45/51 (88.2%)	
2	1 /32 (3.1%)	6/51 (11.8%)	
<b>PI-RADS v2.1 category</b>			<b>&lt; .001<sup>b</sup></b>
3	13/32 (40.6%)	7/51 (13.7%)	
4	14/32 (43.8%)	18/51 (35.3%)	
5	5 /32 (15.6%)	26/51 (51.0%)	
<b>MRI-extraprostatic extension grade</b>			<b>.04<sup>b</sup></b>
0	19 (59.4%)	21/51 (41.2%)	
1	11 (34.4%)	13/51 (25.5%)	
2	2 (6.3%)	5/51 (9.8%)	
3	0 (0%)	12/51 (23.5%)	
<b>Number of targeted cores</b>	3.1 (2–4)	3.0 (2–4)	.54
<b>Number of systematic cores</b>	12 (12–12)	12 (12–12)	>.99
<b>Number of systematic cores harvesting index tumor<sup>a</sup></b>	1.0 (1.0–3.0)	3.0 (1.0–5.0)	.09
<b>Tumor detection rate of each biopsy method</b>			
Combined biopsy	32/32 (100%)	51/51 (100%)	>.99 <sup>c</sup>
Targeted biopsy	24/32 (75.0%)	43/51 (84.3%)	.30
Systematic biopsy	29/32 (90.6%)	49/51 (96.1%)	.37 <sup>c</sup>
<b>Biopsy-confirmed MRI-visible index tumor</b>			.10
Present	27/32 (84.4%)	49/51 (96.1%)	
Absent	5/32 (15.6%)	2/51 (3.9%)	
<b>Integrated Grade Group of MRI-visible index tumor (n=76)</b>			.62 <sup>b</sup>
1	5/27 (18.5%)	5/49 (10.2%)	
2	11/27 (40.7%)	25/49 (51.0%)	
3	7 /27 (25.9%)	9/49 (18.4%)	
4–5	4 /27 (14.8%)	10/49 (20.4%)	
<b>Tumor multifocality in RP</b>			.30
<b>Single</b>	4/32 (12.5%)	11/51 (21.6%)	
<b>Multiple</b>	28/32 (87.5%)	40/51 (78.4%)	
<b>Index tumor volume in RP (mL, IQR)</b>	1.3 (0.9–2.3)	2.3 (1.3–4.6)	<b>.02</b>
<b>Index tumor diameter in RP (mm, IQR)</b>	19.5 (15.3–21.8)	22.0 (16.0–29.0)	.06
<b>Grade Group in RP</b>			
1	4/32 (12.5%)	1/51 (2.0%)	.21 <sup>b</sup>
2	14/32 (43.8%)	24/51 (47.1%)	
3	9/32 (28.1%)	13/51 (25.5%)	

4–5	5/32 (15.6%)	13/51 (25.5%)	
<b>Pathologic T stage</b>			
pT2	25/32 (78.1%)	25/51 (49.0%)	<b>.01<sup>b</sup></b>
pT3a	6/32 (18.8%)	19/51 (37.3%)	
pT3b	1/32 (3.1%)	7/51 (13.7%)	
<b>Pathologic N stage</b>			
pN0/Nx	32/32 (100%)	50/51 (98.0%)	>.99 <sup>c</sup>
pN1	0/32 (0%)	1/51 (2.0%)	
<b>Resection margin</b>			
Clear	23/32 (71.9%)	31/51 (60.8%)	.30
Involved	9/32 (28.1%)	20/51 (39.2%)	

<sup>a</sup> Determined from multiparametric MRI; <sup>b</sup> Mantel-Haenszel Chi-Square test; <sup>c</sup> Fisher's exact test; GG, Grade Group; IQR, interquartile range; MRI, magnetic resonance imaging; PI-RADS: Prostate Imaging Reporting and Data System; RP, radical prostatectomy. Bolding indicates statistically significant values ( $P < .05$ ).

**Supplementary Table 2** Spearman correlation analysis of tumor size in magnetic resonance imaging or maximum tumor length in prostate needle biopsy by various interpretation methods with tumor length in radical prostatectomy

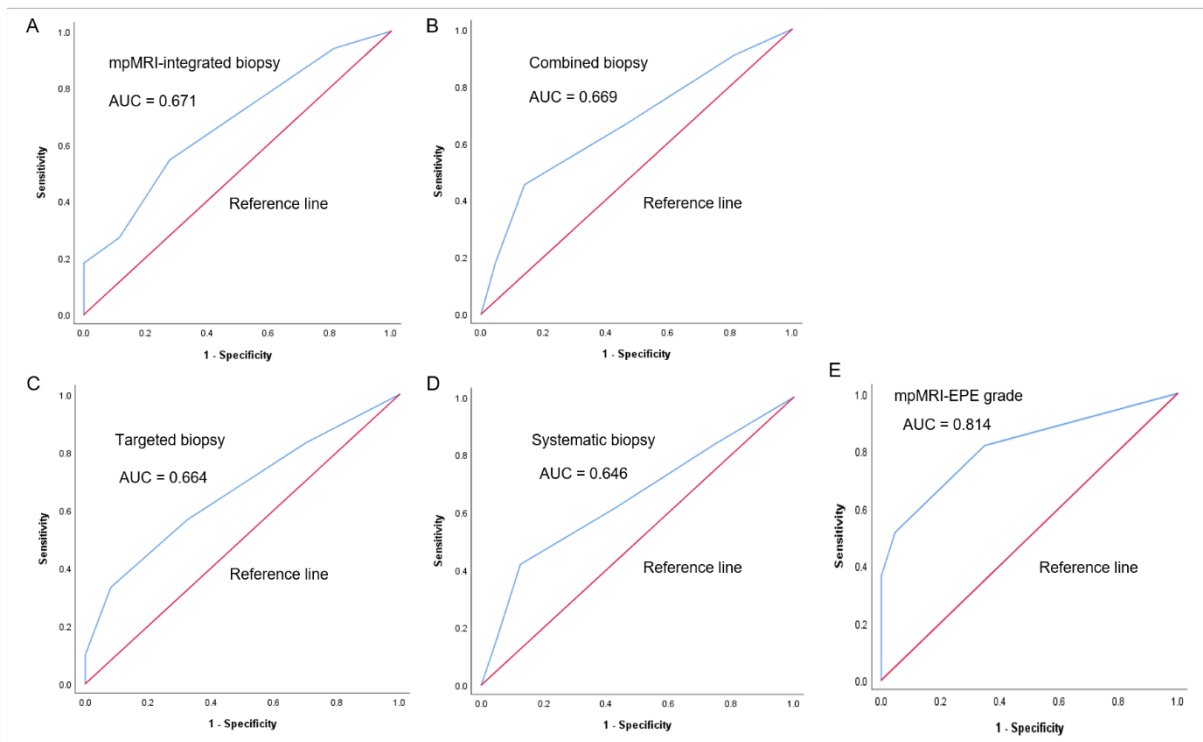
<b>Maximum tumor length</b>	<b>R<sup>a</sup></b>	<b>P Value</b>
<b>Multiparametric MRI-measured</b>	0.592	<.001
<b>Targeted cores (collapsed method)</b>	0.441	<.001
<b>Targeted cores (discontinuous method)</b>	0.556	<.001
<b>Systematic cores (collapsed method)</b>	0.313	<.001
<b>Systematic cores (discontinuous method)</b>	0.386	<.001
<b>Combined cores<sup>b</sup> (collapsed method)</b>	0.487	<.001
<b>Combined cores<sup>b</sup> (discontinuous method)</b>	<b>0.590</b>	<.001

<sup>a</sup>Spearman correlation coefficients with tumor length in radical prostatectomy; <sup>b</sup>The highest positive core length among targeted and systemic cores; MRI, magnetic resonance imaging.

**Supplementary Table 3** Prediction of extraprostatic extension (EPE) using maximum tumor length in biopsy cores measured by collapsed and discontinuous methods

<b>MRI-EPE grade or maximum tumor length in biopsy cores</b>	<b>AUC for EPE<sup>a</sup></b>
<b>Multiparametric MRI-EPE grade</b>	0.822
<b>Targeted (collapsed method)</b>	0.724
<b>Targeted (discontinuous method)</b>	0.712
<b>Systematic (collapsed method)</b>	0.641
<b>Systematic (discontinuous method)</b>	0.655
<b>Combined<sup>b</sup> (collapsed method)</b>	0.738
<b>Combined<sup>b</sup> (discontinuous method)</b>	0.745

<sup>a</sup>The AUC for prediction of EPE; <sup>b</sup>The highest positive core length among targeted and systemic cores; AUC, area under the receiver operating characteristic curve; EPE, extraprostatic extension; MRI, magnetic resonance imaging; RMI, resection margin involvement.



**Supplementary Figure 2 Receiver operating characteristic (ROC) curves for the prediction of extraprostatic extension (EPE) in radical prostatectomy.** The performances for predicting EPE were evaluated as the area under the ROC curve (AUC). **A–D.** Predictive performances using the grade groups (GGs) of four biopsy-interpretation methods. The predictive performance using GGs by multiparametric magnetic resonance imaging (mpMRI)-integrated biopsy (AUC 0.671) (A) was higher than that of GGs by combined biopsy (AUC 0.669) (B), targeted biopsy (AUC 0.664) (C), and systematic biopsy (AUC 0.646) (D). **E.** The predictive performance using mpMRI-EPE grade (AUC 0.814) was higher than that using GGs by any of the biopsy-interpretation methods. AUC, area under the receiver operating characteristic curve; EPE, extraprostatic extension; GG, grade group; mpMRI, multiparametric magnetic resonance imaging.