Association of PSMA PET Results at Biochemical Recurrence with Metastasis Free Survival by Conventional Imaging in Patients with Locally Advanced or High-risk Localized Prostate Cancer Initially Treated with Radical Prostatectomy: A Retrospective Multicenter Study

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KEY TAKEAWAY

Incorporating PSMA PET-CT results at time of BCR may enable more precise and effective treatment strategies

BCR, Biochemical recurrence; PSMA PET-CT, Prostate-specific membrane antigen positron emission tomography-computed tomography.

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CONCLUSIONS

- Patients with LAHR PCa who have PSMA PET+ lesions at BCR following RP experience an MFS period three times shorter than patients without PSMA PET+ lesions at BCR
- A longer follow-up is required to better evaluate associations with overall survival in this patient population
- Further analyses with a larger patient population across institutions in the United States and Europe are ongoing to increase the robustness of these MFS rate estimates

BCR, Biochemical recurrence; LAHR PCa, Locally advanced high-risk prostate cancer; MFS, Metastasis free survival; PSMA PET, Prostate-specific membrane antigen positron emission tomography; RP, Radical prostatectomy.

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INTRODUCTION

- LAHR PCa comprises 10%–15% of new PCa diagnoses in the United States and carries a higher risk of BCR, reaching 60% after definitive treatment, compared to low-risk disease[1]
- Conventional imaging, including CT, MRI, and single-photon bone scans, often fails to detect disease sites at lower PSA levels during BCR[2]
- PSMA PET-CT is used to stage PCa at BCR and has a higher sensitivity than conventional imaging (i.e. CT and bone scan)[3,4]
- There is a significant lack of evidence on how PSMA PET findings affect treatment decisions,[3] including strategies such as radiation, androgen deprivation therapy, or systemic therapies, and their timing; as well as the resulting clinical outcomes in patients with conventional imaging LAHR PCa experiencing BCR after RP
- **We investigated the association between PSMA PET-CT results and MFS by conventional imaging in LAHR PCa patients with BCR who had undergone RP**

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1. Shore ND et al. *Prostate Cancer Prostatic Dis.* 2024;27(2):192-201. 2. Mena E et al. *World J Urol.* 2021 Mar;39(3):687-699. 3. Meijer D et al. *Eur Urol Oncol.* 2022;5(2):146-52. 4. Hoffman A et al. *Cancers (Basel).* 2023;29;15(13):3402.

BCR, Biochemical recurrence; CT, -computed tomography; LAHR, Locally advanced high-risk; MFS, Metastasis free survival; MRI, Magnetic resonance imaging; PCa, prostate cancer; PSA, Prostate-specific antigen; PSMA, Prostate-specific membrane antigen; PET, Positron emission tomography; RP, Radical prostatectomy.

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METHODS

- Patients with LAHR PCa (characterized by either PSA >20 ng/mL or Gleason Score 8–10, or tumor staging T4a or higher on initial diagnosis and no evidence of metastasis) who experienced BCR following RP and received a PSMA PET-CT scan were retrospectively identified from two academic centers in the United States between January 2016 and January 2024
- PSMA PET+ status was defined as having evidence of a distant lesion by PSMA PET
- Treatment changes were recorded from the time of BCR and up to 60 days post-BCR
- MFS was estimated by conventional imaging (CT and bone scan)
- Time-to-event analysis was performed between patients with PSMA PET positive (PSMA PET+) and PSMA PET negative (PSMA PET−) lesions to estimate effect of imaging results on MFS
- A 1:1 propensity score matching was used to control confounding factors. The propensity score is defined as the probability of being assigned to PSMA PET+ group conditioning on the PSA and treatment change at BCR. This probability is estimated by a logistic regression.

BCR, Biochemical recurrence; CT, Computed tomography; LAHR, Locally advanced high-risk; MFS, Metastasis free survival; PCa, prostate cancer; PSMA, Prostate-specific membrane antigen; PET, Positron emission tomography; PSA, Prostate specific antigen; RP, Radical prostatectomy.

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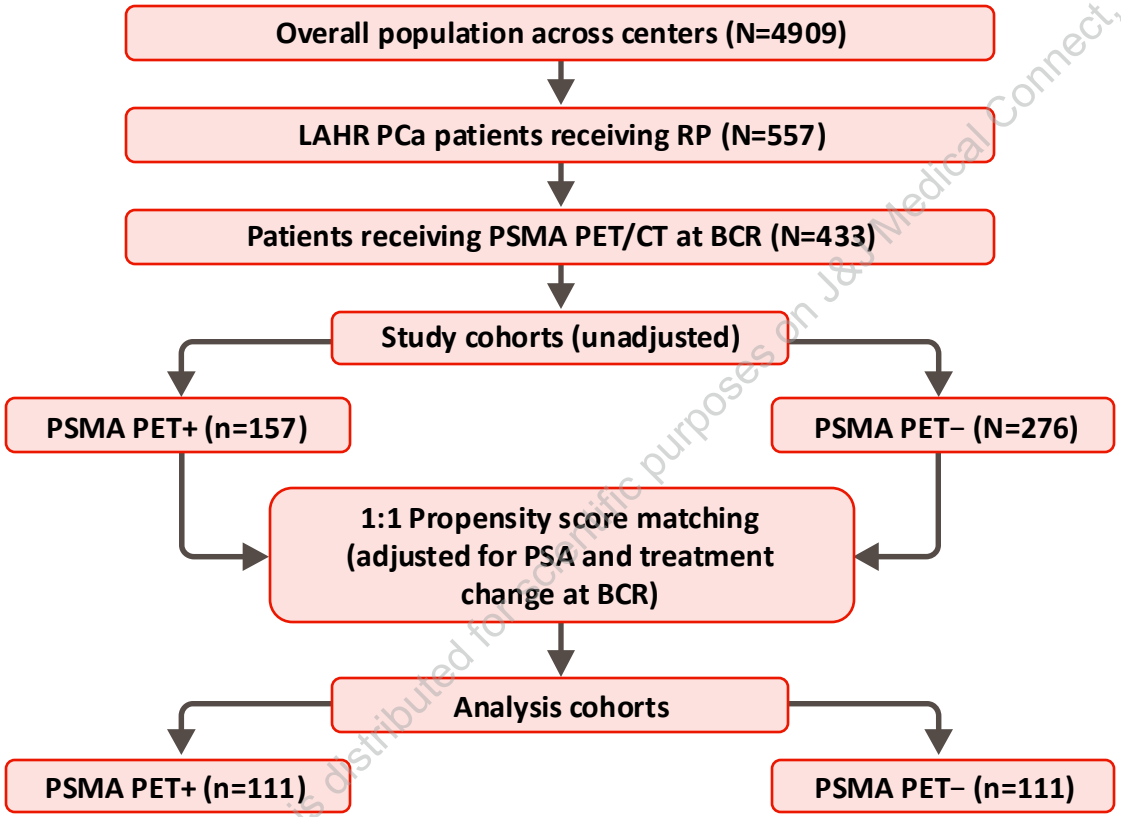

BCR, Biochemical recurrence; CT, Computed tomography; LAHR, Locally advanced high-risk; PCa, Prostate cancer; PET, Positron emission tomography; PSA, Prostate-specific antigen; PSMA, Prostate-specific membrane antigen; RP, Radical prostatectomy.

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RESULTS

- 433 LAHR RP patients with mCRPC who had received PSMA PET-CT at BCR were included
- Of 433 patients, 157 were PSMA PET+
- Overall median follow-up time was 47.3 months (IQR: 21.2–72.8)

Patient characteristics

	PSMA PET+ (n=157)	PSMA PET– (n=276)	Cohen's D	p-value
Age, mean (SD), y	63.1 (7.51)	64.3 (7.10)	0.169	0.114
Race, n (%)				0.294
White	117 (81.2%)	192 (81.0%)		
Black or African American	3 (2.1%)	12 (5.1%)		
Other	24 (16.7%)	33 (13.9%)		
ECOG status				0.544
0	95	149		
1-2	24	31		
Baseline T stage				0.810
T1	12	31		
T2	34	75		
T3-T4	30	59		
Gleason score[a]				0.396
3+3, 3+4	9 (6.4%)	13 (5.0%)		
4+3	7 (5.0%)	25 (9.6%)		
3+5, 4+4, 5+3	68 (48.2%)	123 (47.3%)		
4+5, 5+4, 5+5	57 (40.4%)	99 (38.1%)		
PSA at BCR, median (range)	1.35 (0.2–217.2)	0.51 (0.2–19.9)	0.332	0.013
Time to RP, median (range), mo	2.15 (0.0–45.7)	2.37 (0.0–88.9)	0.023	0.810
Imaging within 4 weeks of PSMA PET, n (%)				0.317
No imaging within 4 weeks	146 (93.0%)	258 (93.5%)		
CT, Bone scan	5 (3.2%)	13 (4.7%)		
Other	6 (3.8%)	5 (1.8%)		

[a]Gleason score reported is the highest value between either biopsy or RP.
BCR, Biochemical recurrence; CT, Computed tomography; ECOG, Eastern Cooperative Oncology Group; IQR, interquartile range ; LAHR, Locally advanced high-risk; mCRPC, Metastatic castration-resistant prostate cancer; mo, Month; PSA, Prostate-specific antigen; PSMA, Prostate-specific membrane antigen; PET, Positron emission tomography; RP, Radical prostatectomy; SD, Standard deviation; y, year.

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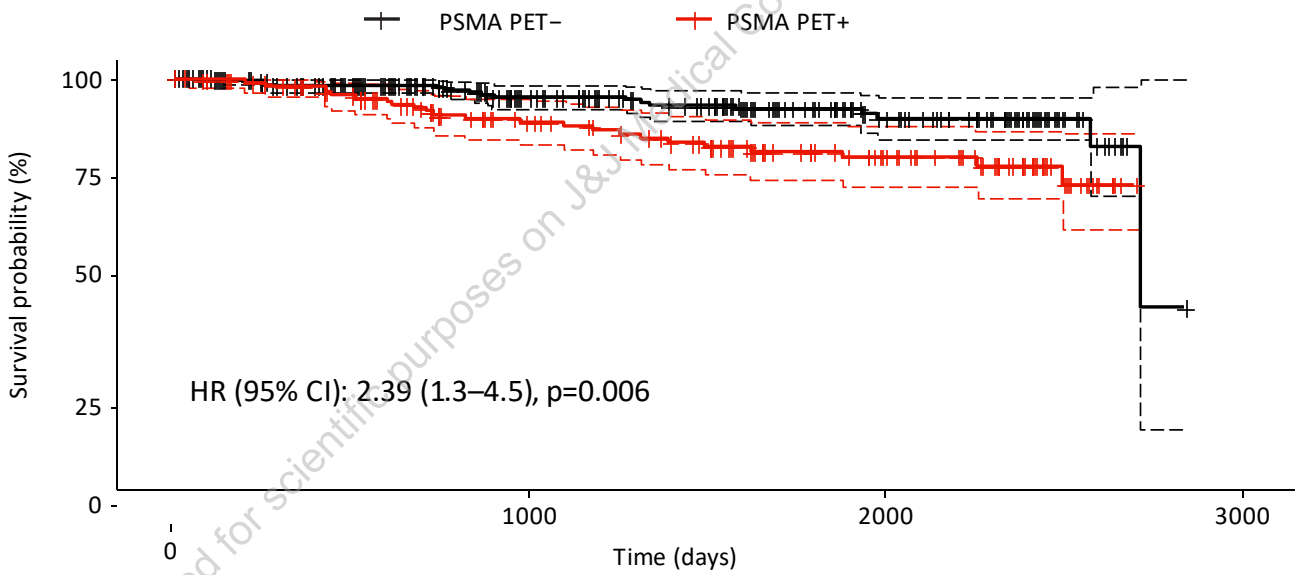
RESULTS

- MFS was significantly shorter for PSMA PET+ versus PSMA PET− patients by conventional imaging (p=0.006; HR: 2.39, 95% CI: 1.3–4.5)

MFS for PSMA PET+ versus PSMA PET− patients (unadjusted)



Number at risk

PSMA PET−	276	148	67	0
PSMA PET+	157	93	51	0

Solid lines are Kaplan-Meier estimates of survival probability. Dashed lines are associated 95% confidence intervals.
CI, Confidence interval; HR, Hazard ratio; MFS, Metastasis free survival; PET, Positron emission tomography; PSMA, Prostate-specific membrane antigen.

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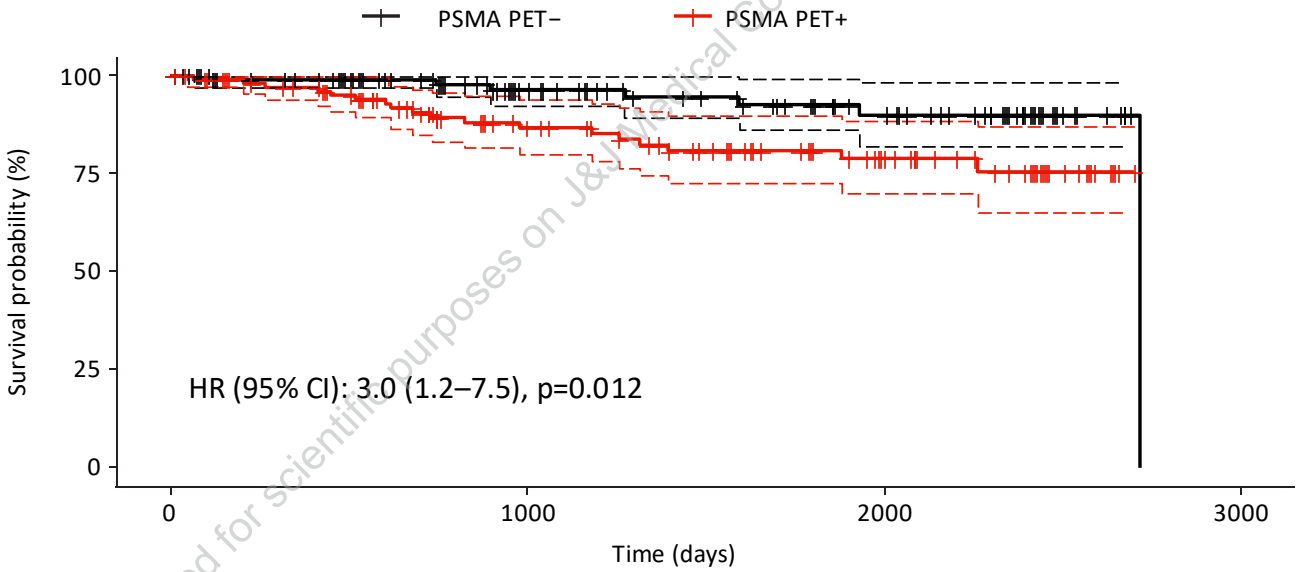
RESULTS

- The difference in MFS remained significant after propensity score matching (p=0.012; HR: 3.0, 95% CI: 1.2–7.5)

MFS for PSMA PET+ versus PSMA PET− patients (adjusted for PSA and treatment change at BCR)



Number at risk

PSMA PET−	111	64	34	0
PSMA PET+	111	65	34	0

Solid lines are Kaplan-Meier estimates of survival probability. Dashed lines are associated 95% confidence intervals.
BCR, Biochemical recurrence; CI, Confidence interval; HR, Hazard ratio; MFS, Metastasis free survival; PET, Positron emission tomography; PSA, Prostate-specific antigen; PSMA, Prostate-specific membrane antigen.

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