

Rani Ashouri¹, William Snead¹, John DiBianco², Jason Joseph², Paul Crispen², Padraic O'Malley², Joseph Grajo^{2,3}, Sara Falzarano^{2,4}, Fahong Yu⁵, Thomas Stringer², Li-Ming Su², Susan Penelope Reynolds⁶, Christopher J Weight⁶, Tarik Benidir²
¹University of Florida, College of Medicine, Gainesville, FL, ²University of Florida, Department of Urology, Gainesville, FL, ³University of Florida, UF Health, Department of Radiology, Gainesville, FL, ⁴University of Florida, UF Health, Department of Pathology, Immunology and Laboratory Medicine, Gainesville, FL, ⁵University of Florida, Interdisciplinary Center of Biotechnology Research, ⁶University of Florida, Department of Anesthesia, ⁶Glickman Urological and Kidney Institute, Cleveland Clinic



INTRODUCTION AND OBJECTIVES

- Prostate Imaging Reporting and Data System (PI-RADS) Score V2.1 has improved the detection of clinically significant prostate cancer (csPCa).
- A majority of prostate cancer (PCa) arises from the Peripheral Zone (70-80%). 20-25% of PCa arises in the TZ while 1-8% of PCa is identified in the CZ.
- Despite PI-RADS v2.1 consideration of zonal imaging differences, competing disease, such as BPH, mimic suspicious lesions, and pose diagnostic challenges.
- PSA density (PSAD), a surrogate for discerning BPH and PCa, has yet to be included in the evaluation of suspicious PI-RADS lesions.
- We explore the predictive accuracy of PI-RADS lesions for csPCa when stratified by zone and PSAD.

METHODS

- Single center retrospective review of patients (2016-2023) harboring PI-RADS 3-5 lesions who subsequently underwent prostate biopsy. CsPCa defined as Grade Group (GG) ≥ 2 .
- Imaging and pathology reviewed by GU radiologist and pathologist respectively
- PSAD² and ADC values were stratified as ≥ 0.15 ng/mL² vs. < 0.15 ng/mL², and ≥ 700 vs < 700 mm²/s $\times 10^{-6}$ respectively.

RESULTS

Characteristic	Count or Median (IQR)
Total	
Number of patients	N=437
Number of lesions	N=552
Number of MRI studies	N=473
Age	72 years (66, 76)
Race/Ethnicity (self-identified)	
White/Caucasian	81.9%
Black/African American	10.5%
Asian or Pacific Islander	1.6%
Other	5.3%
+/- Hispanic or Latino	3.7%
PSA	7.0 ng/mL (5.1, 10.9)
Volume	46 cc (34.0, 64.6)
PI-RADS	
PI-RADS 3	N=90
PI-RADS 4	N=281
PI-RADS 5	N=181
Lesion size	1.2 cm (.9, 1.8)
Zonal Distribution of Lesions	
Number of PZ lesions	N=435
Number of TZ lesions	N=115
Number of CZ lesions	N=2
Biopsy status	
Previous biopsy	48.9%
Biopsy naïve	51.1%
Disease status	
Benign	26.3%
Indolent (GG1)	20.3%
csPCa	53.4%
Zonal Distribution of csPCa	
PZ	78.8%
TZ	20.8%
CZ	0.4%
Subsequent Prostatectomy Proportion	19.2%

Table 1: Demographic data of the population studied.

RESULTS (contd.)

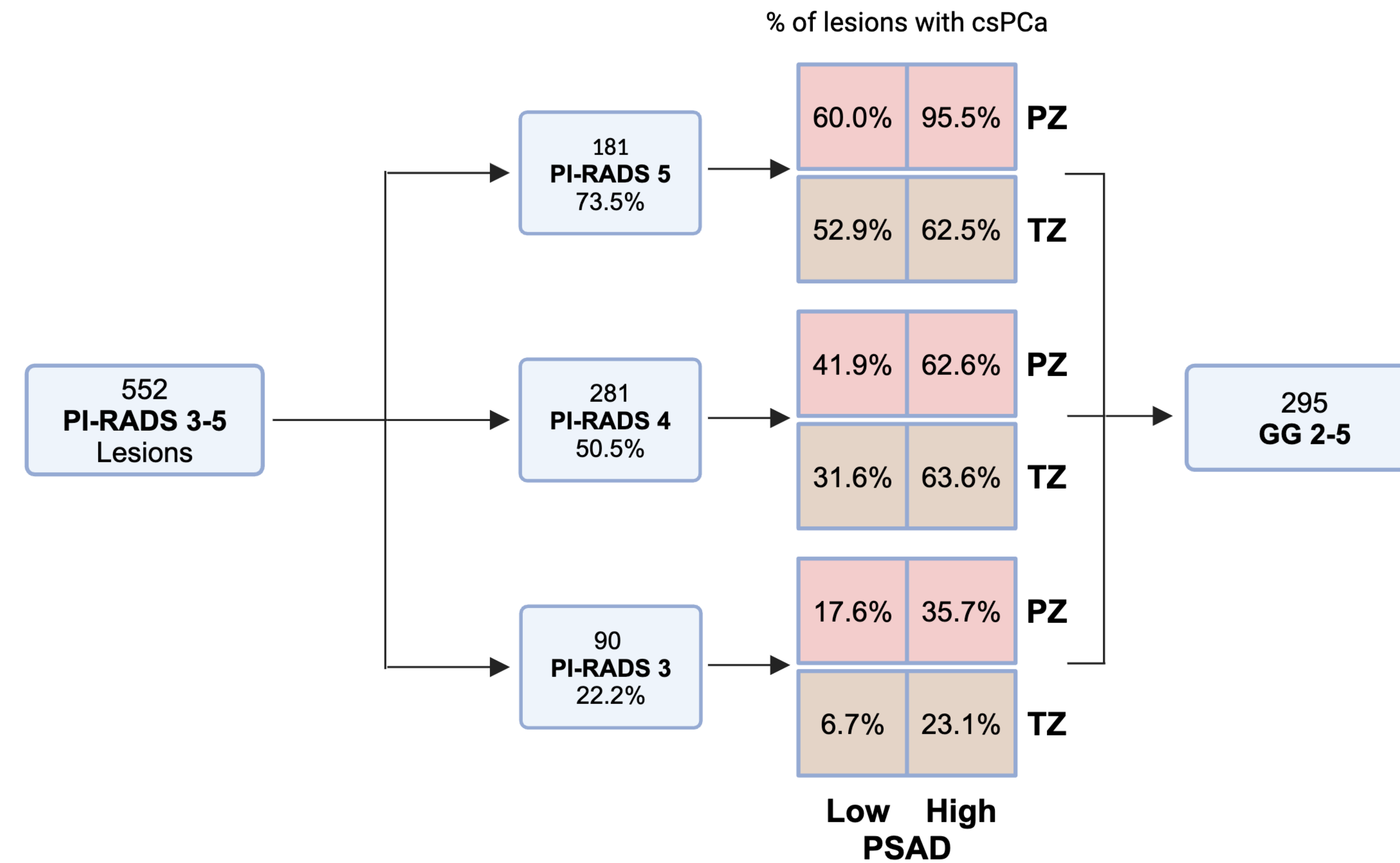


Figure 1: Overview of clinically significant prostate cancer stratified by zone and PSA density cutoff 0.15ng/mL²

- Increasing PI-RADS scores (3 to 5) was associated with increased csPCa regardless of PSAD or zone.**
 PI-RADS 3 22.2%, PI-RADS 4 50.5%, PI-RADS 5 73.5%
- The PZ was associated with higher proportion of csPCa as compared to TZ regardless of PI-RADS score or PSA density (p<.05).**
 TZ + PI-RADS 3-5 54.0%
 PZ + PI-RADS 3-5 60.6%
- Elevated PSAD improved the accuracy of csPCa detection in both the PZ and TZ regardless of PI-RADS score.**
 ≥ 0.15 ng/mL² + TZ 54.7% versus < 0.15 ng/mL² 31.4% (p<.05)
 ≥ 0.15 ng/mL² + PZ 69.5% versus < 0.15 ng/mL² 42.7% (p<.05)
- In the TZ, a low PSAD shows significant differences in csPCa overall and when stratified by PI-RADS score.**
 < 0.15 ng/mL² + PI-RADS 3 6.7% versus ≥ 0.15 ng/mL² 23.1%
 < 0.15 ng/mL² + PI-RADS 4 31.6% versus ≥ 0.15 ng/mL² 63.6%
 < 0.15 ng/mL² + PI-RADS 5 52.9% versus ≥ 0.15 ng/mL² 62.5%

RESULTS (contd.)

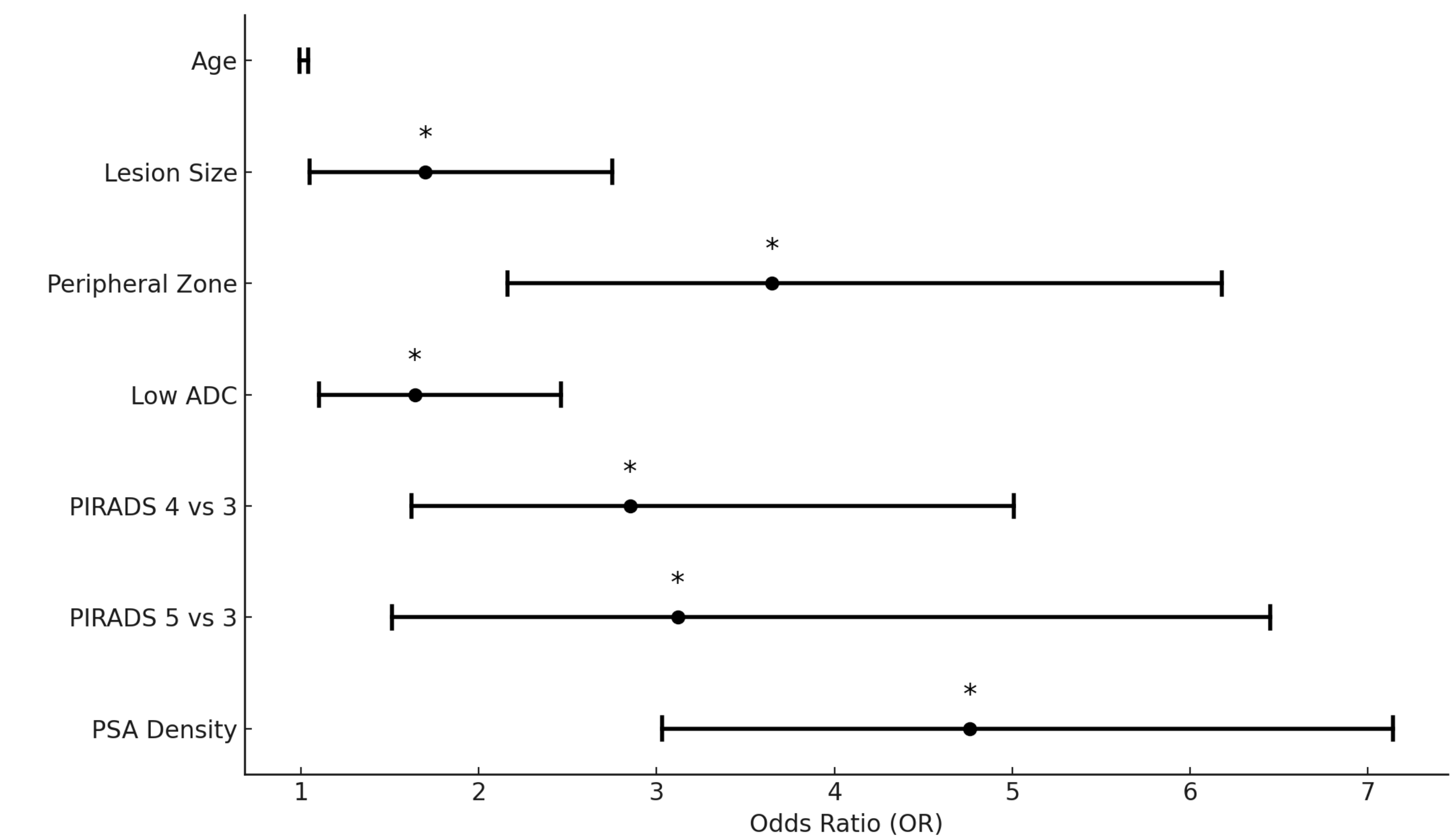


Figure 2: Odds ratios (OR) of lesion and patient characteristics for clinically significant prostate cancer assuming all other features held constant. * denotes p<.05.

- PZ has a 3.2x greater chance of harboring GG2-GG5 as compared to the TZ for all PI-RADS 3-5 lesions.
- A PSAD cutoff of ≥ 0.15 ng/mL² has a 4.76x increased risk of GG2-GG5 for all PI-RADS 3-5 lesions as compared to a PSAD < 0.15 ng/mL², independent of zone.

DISCUSSION AND CONCLUSIONS

- In our single institution study csPCa detection increases with increasing PI-RADS score, consistent with standard practice.
- The PZ and a PSAD cutoff ≥ 0.15 were strongly associated with a higher detection of csPCa across all PI-RADS scores.
- In TZ lesions with low PSAD patients, csPCA rate ranged from 6.7%-52.9% as compared to high PSAD and PZ lesions (35.7-95.5%). In cases of low probability (<10%), omission of biopsy can be considered.
- The addition of PSAD and zonal distribution of MRI visible lesions may serve as a useful adjunct when discussing risk stratification and biopsy needs.

REFERENCES

1. Lee JJ, Thomas IC, Nolley R, Ferrari M, Brooks JD, Leppert JT. Biologic differences between peripheral and transition zone prostate cancer. Prostate. 2015 Feb;75(2):183-90. doi: 10.1002/pros.22903. Epub 2014 Oct 18. PMID: 25327466; PMCID: PMC4270836.
 2. Pellegrino F, Tin AL, Martini A, Vertosick EA, Porwal SP, Stabile A, Gandaglia G, Eastham JA, Briganti A, Montorsi F, Vickers AJ. Prostate-specific Antigen Density Cutoff of 0.15 ng/ml/cc to Propose Prostate Biopsies to Patients with Negative Magnetic Resonance Imaging: Efficient Threshold or Legacy of the Past? Eur Urol Focus. 2023 Mar;9(2):291-297. doi: 10.1016/j.euf.2022.10.002. Epub 2022 Oct 19. PMID: 36270887; PMCID: PMC10578357.