



JOHNS HOPKINS
M E D I C I N E

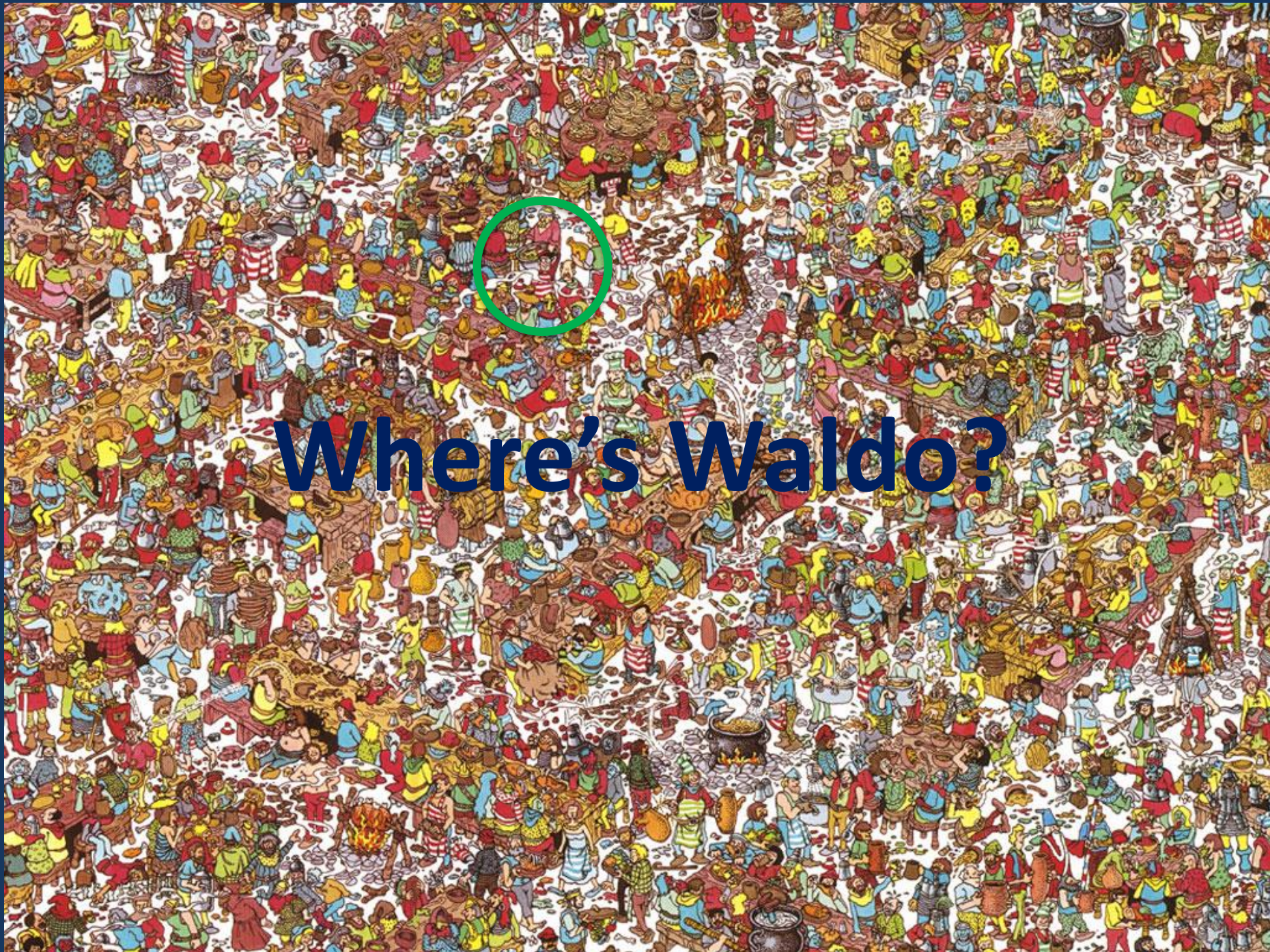


Using the Prostate Imaging - Reporting and Data System (PI-RADS version 2.1) for Scoring Prostate Lesions on Multiparametric Prostate MRI

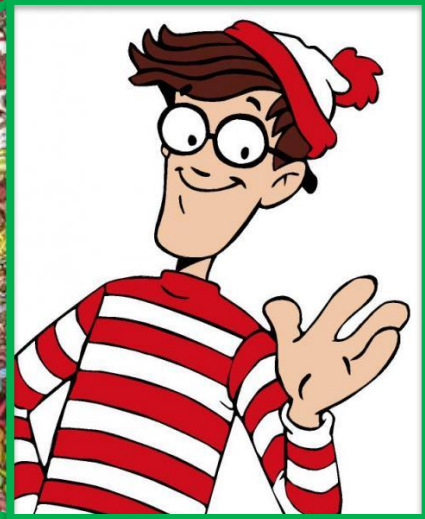
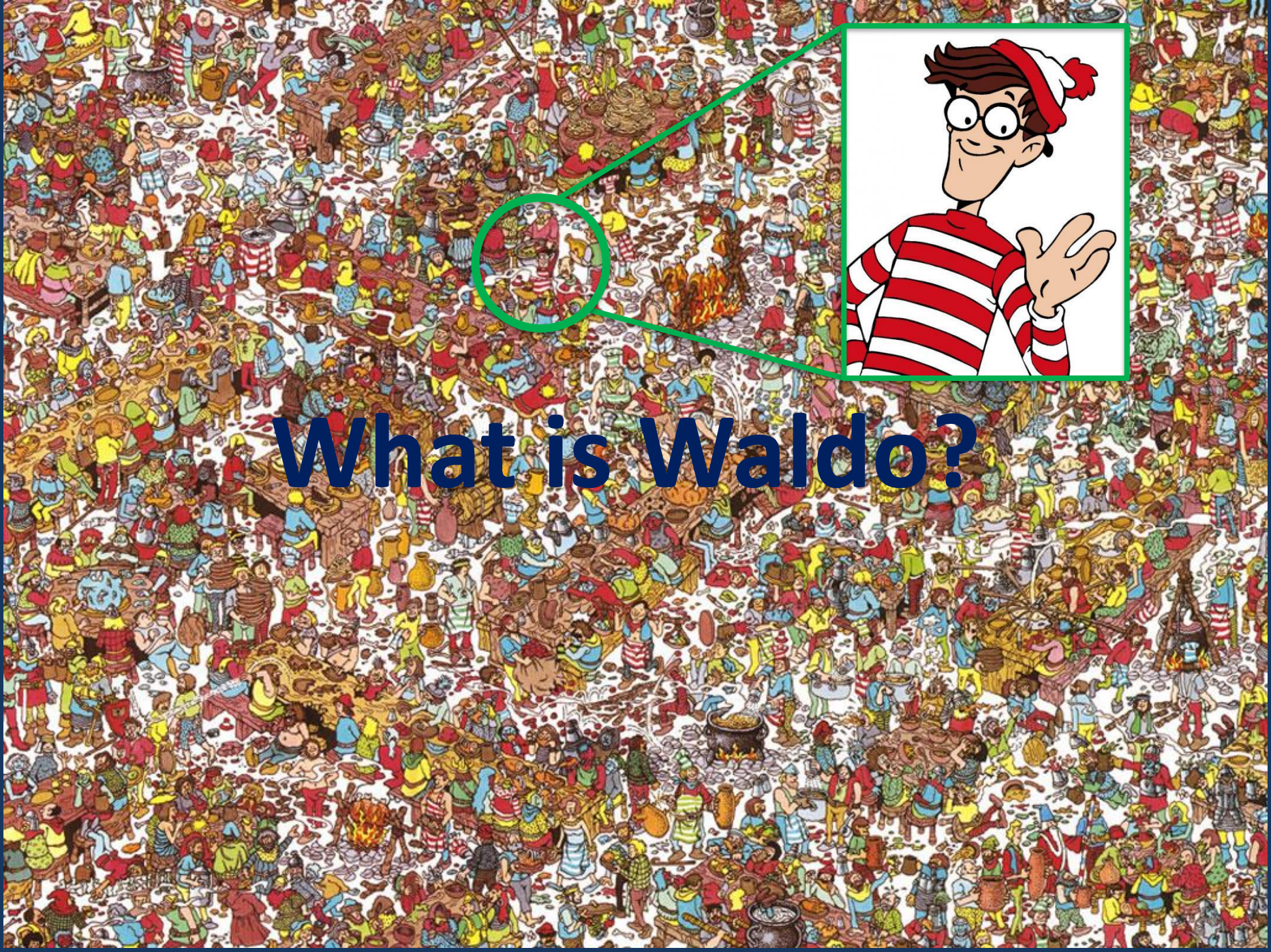
Katarzyna J. Macura, MD, PhD, FACR

Professor of Radiology, Urology, and Oncology

**The Russell H. Morgan Department of Radiology and
Radiological Science, Johns Hopkins University
Baltimore, MD**



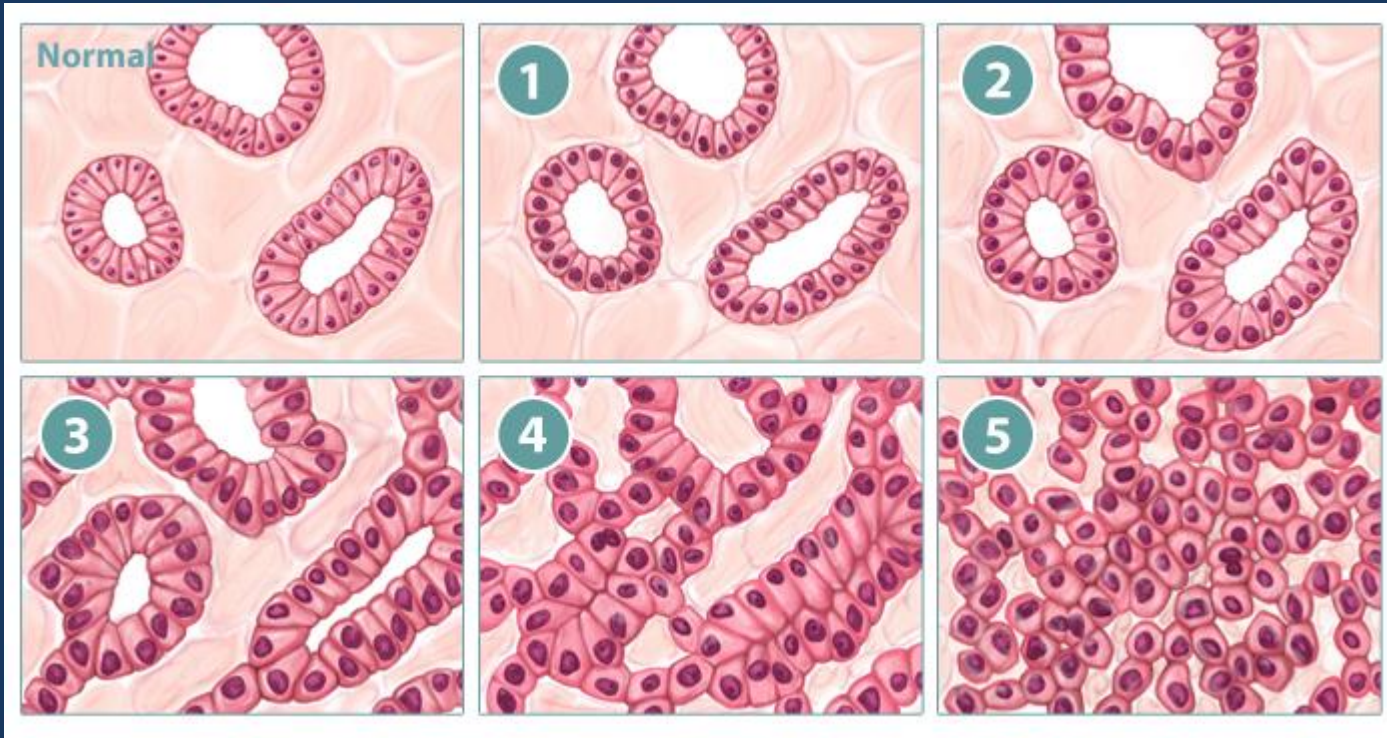
Where's Waldo?



What is Waldo?

Prostate Cancer Gleason Score

gleasonscore.com



$$3+3=6$$

$$3+4=7$$

$$4+3=7$$

$$4+4=8$$

$$3+5=8$$

$$4+5=9$$

$$5+4=9$$

$$5+5=10$$

- **Gleason Score = Gleason Sum = TWO** most common types of **glandular patterns** within the tumor
- Higher Gleason scores indicate more aggressive tumors

Prognostic Gleason Grade Grouping - GG

Indolent

Lethal

Gleason grade groups accurately reflect prognosis (JHU - ISUP):

- G score 3+3=6 (well-differentiated) prognostic GG 1
- G score 3+4=7 (moderately differentiated) prognostic GG 2
- G score 4+3=7 (mod-poorly differentiated) prognostic GG 3
- G score 4+4=8 (poorly differentiated) prognostic GG 4
- G score 4+5=9, 5+4=9, 5+5=10 (undifferentiated) prognostic GG 5

- **5-year biochemical free survival rates:**

G Score	3+3	3+4	4+3	8	9-10
GG	1	2	3	4	5
Biopsy	94.6%	82.7%	65.1%	63.1%	34.5%
RP	96.6%	88.1%	69.7%	63.7%	34.5%

p < 0.001

Clinically Significant Cancer

- Gleason score ≥ 7 ($\geq$ ISUP GG2), and;
- Volume $\geq 0.5\text{cc}$, and/or;
- Extraprostatic extension (EPE)



Multiparametric Prostate MRI (mpMRI)

- Includes:
 - a) morphological imaging
T2-weighted (T2WI)
 - b) functional imaging
diffusion-weighted (DWI)
dynamic contrast-enhanced MRI (DCE-MRI)
MR spectroscopy (MRS)
- Yields qualitative and quantitative image biomarkers



PI-RADS



Post-processing

PI-RADS®

Prostate Imaging – Reporting
and Data System

2019
Version 2.1



ACR®
AMERICAN COLLEGE OF
RADIOLOGY
QUALITY IS OUR IMAGE

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journal homepage: www.europeanurology.com

EAU
European Association of Urology



Review – Prostate Cancer

Prostate Imaging Reporting and Data System Version 2.1: 2019 Update of Prostate Imaging Reporting and Data System Version 2

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Geert Villeirs^e, Katarzyna J. Macura^f, Clare M. Tempany^g, Peter L. Choyke^a,
Francois Cornud^h, Daniel J. Margolisⁱ, Harriet C. Thoeny^j, Sadhna Verma^k,
Jelle Barentsz^{k,1}, Jeffrey C. Weinreb^{m,1}

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PI-RADS v2.1

Prostate Imaging Reporting and Data System

**5 point scale to predict
MR-visible nodule's likelihood of
being a clinically significant
cancer**

PI-RADS Version 2.1 *European Urology* 2019

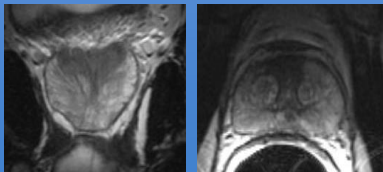
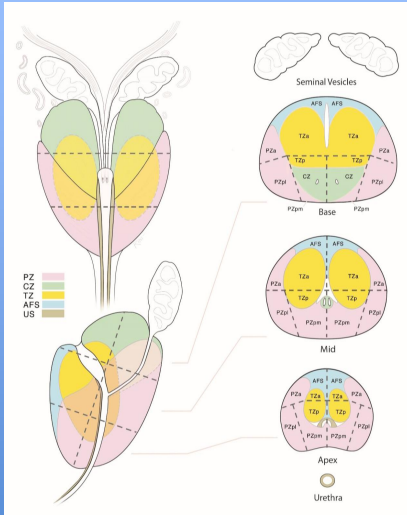
PI-RADS Assessment Categories

- | | | |
|---|--------------|--|
| 1 | Very low | clinically significant cancer is highly unlikely |
| 2 | Low | clinically significant cancer is unlikely |
| 3 | Intermediate | clinically significant cancer is equivocal |
| 4 | High | clinically significant cancer is likely |
| 5 | Very high | clinically significant cancer is highly likely |

Step-by-step Assessment

1

Anatomical Localization



2

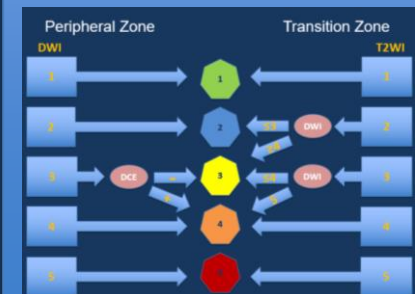
Qualitative Evaluation on T2WI, DWI (1-5 score) and DCE (positive/negative)

Score	Peripheral Zone (PZ)
1	Uniformly hyperintense (normal)
2	Linear, wedge-shaped, or diffuse mild hypointensity, usually indistinct margin
3	Non-circumscribed, rounded, mild hypointensity
4	Circumscribed, homogenous moderate hypointense focus/mass confined to prostate and <1.5 cm in greatest dimension
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

3

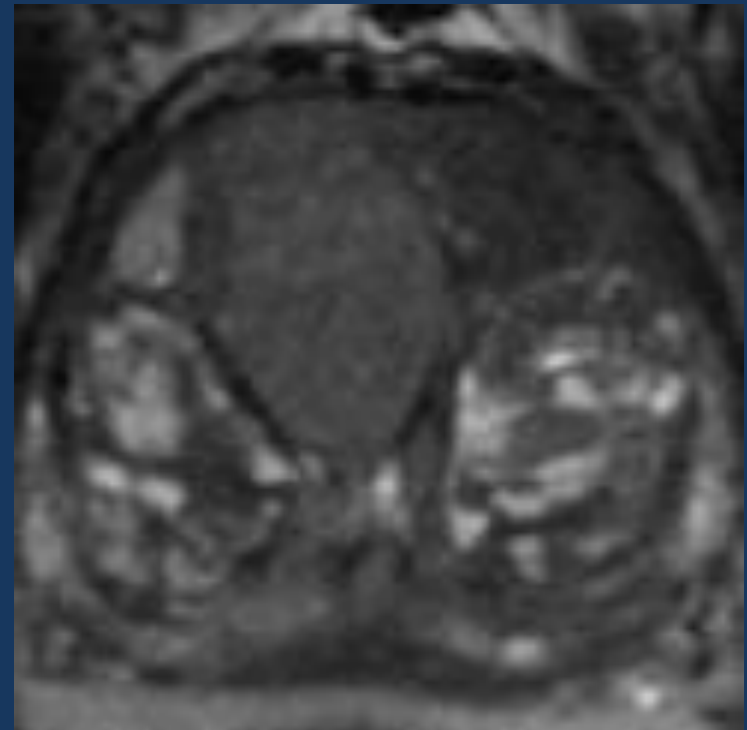
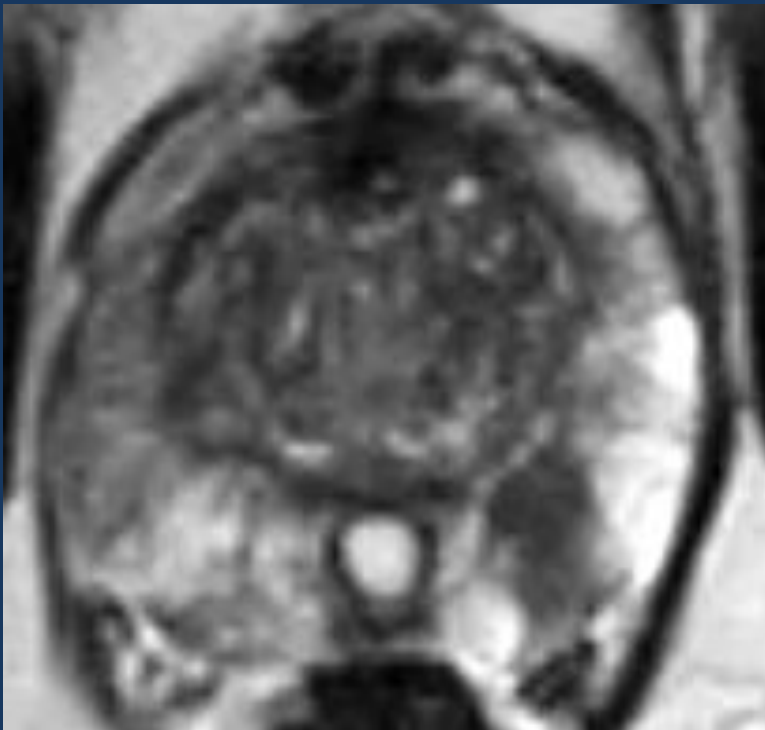
Overall PI-RADS Assessment

DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



Detection: Prostate Background Assessment

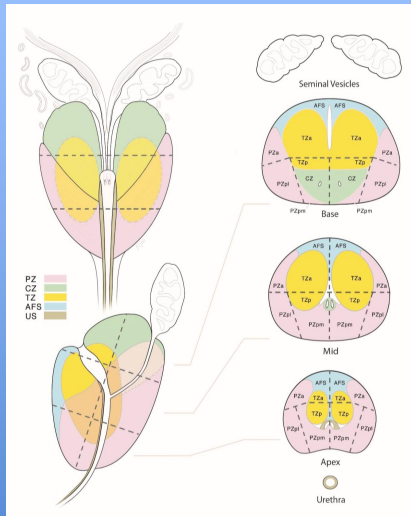
- What is FOCAL and different from the background?
- What is ASYMMETRIC?



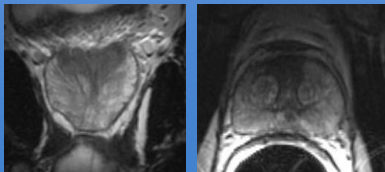
Step-by-step Assessment

1

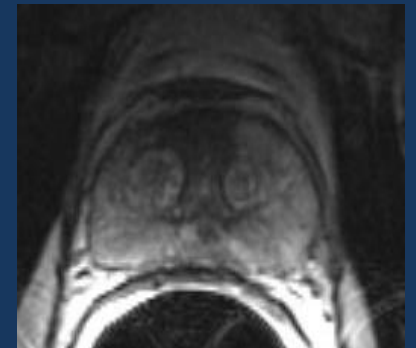
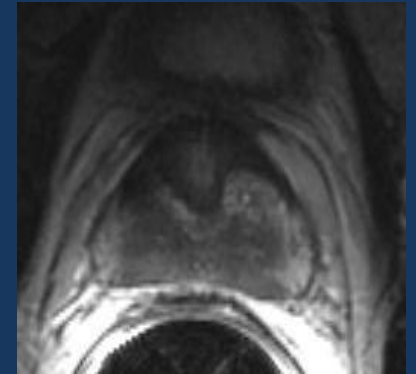
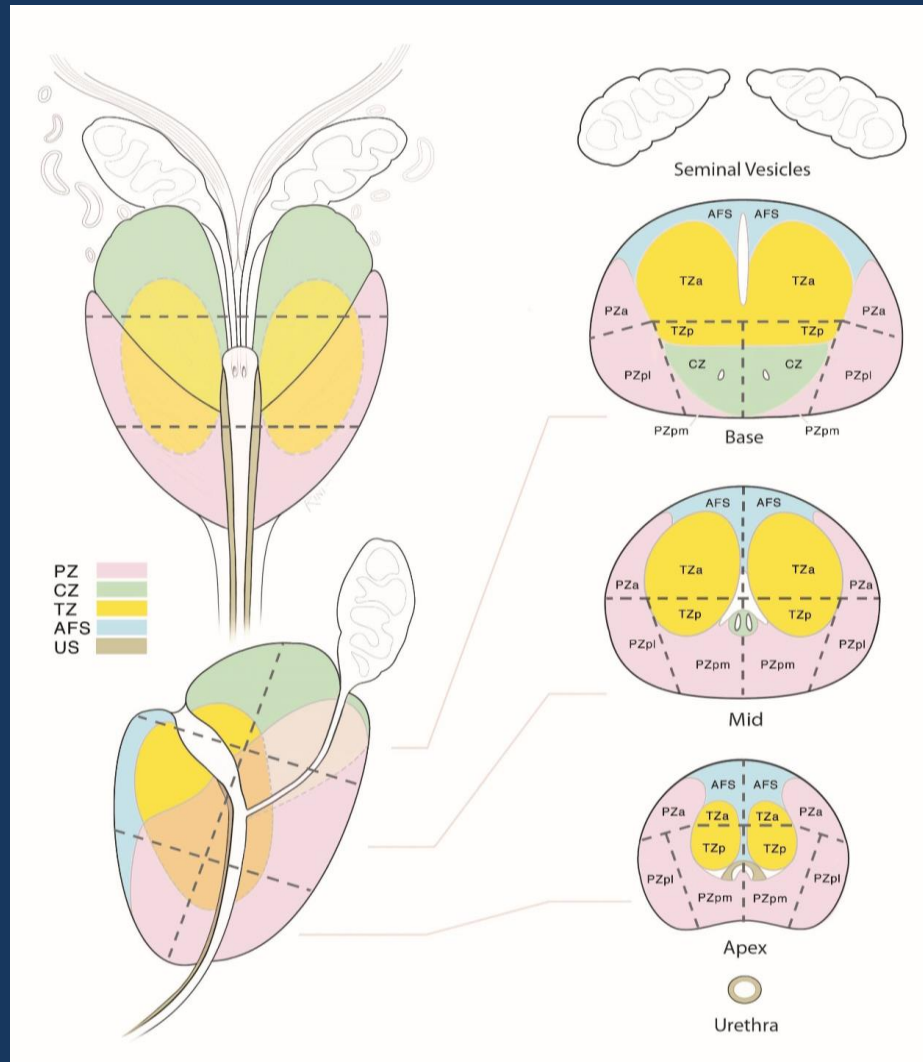
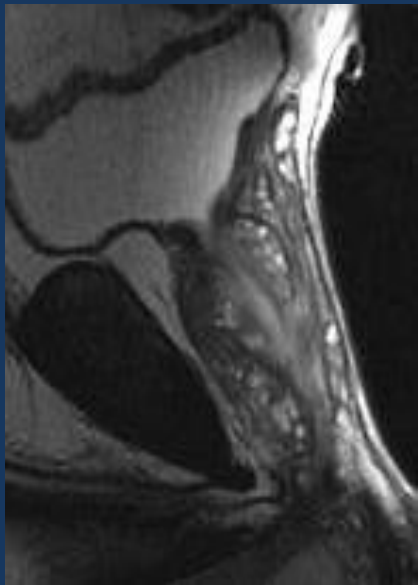
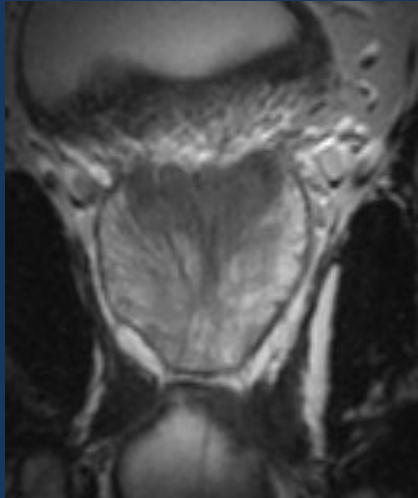
Anatomical Localization



PZ peripheral zone
CZ central zone
TZ transition zone
AFS Anterior Fibromuscular Stroma
US Urethral Sphincter



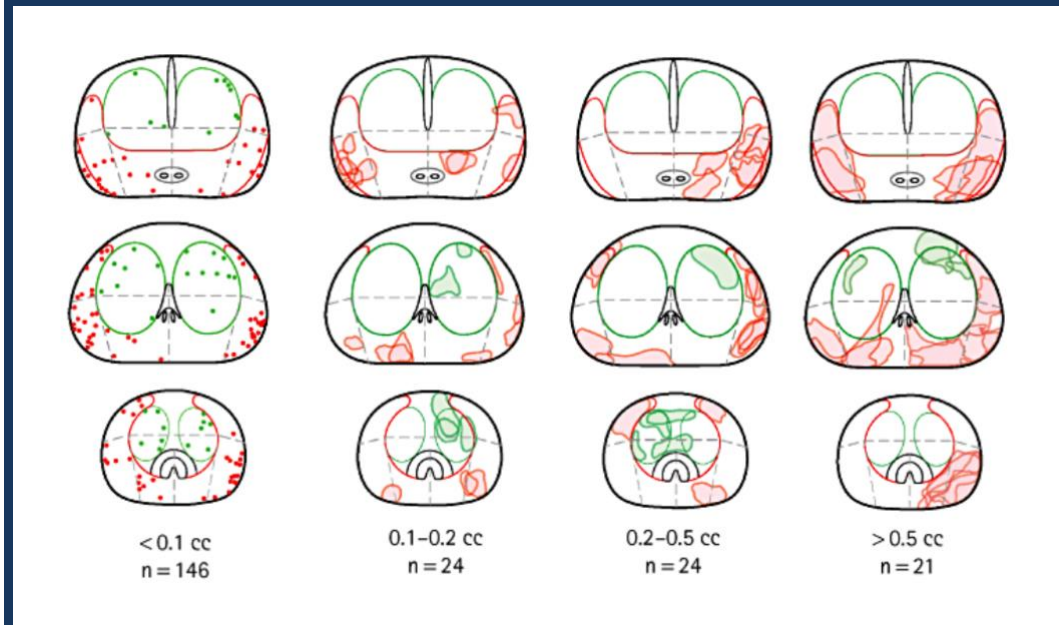
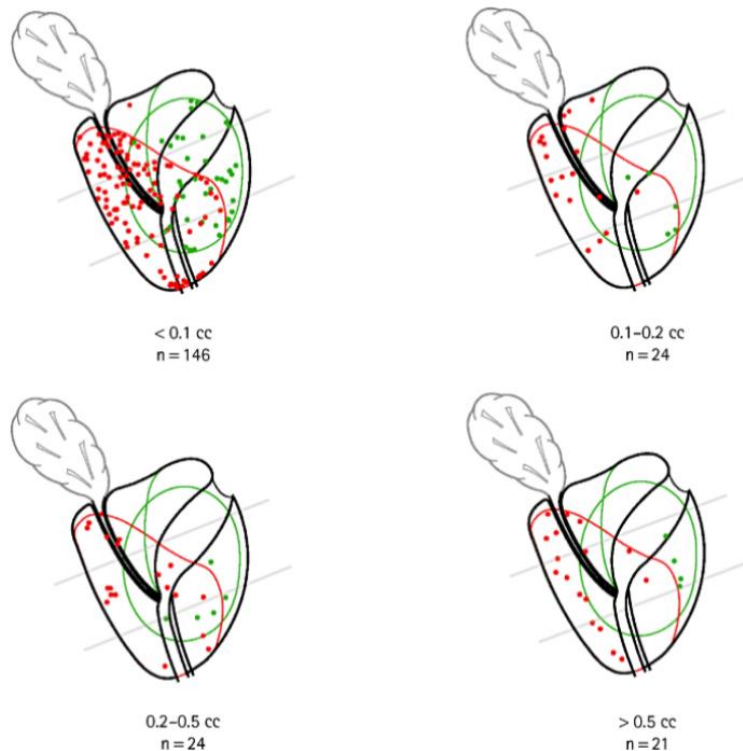
Prostate Zonal Anatomy



Prostate Zonal Anatomy: Cancer Origin

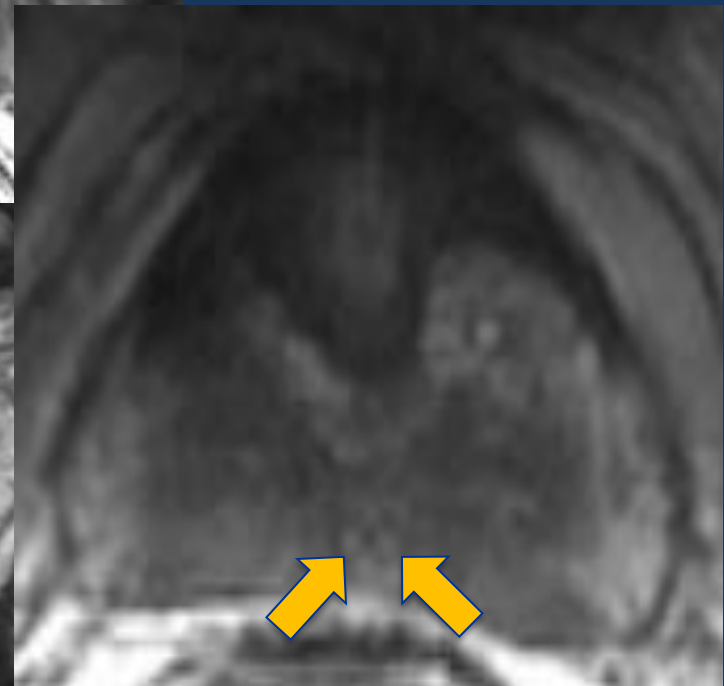
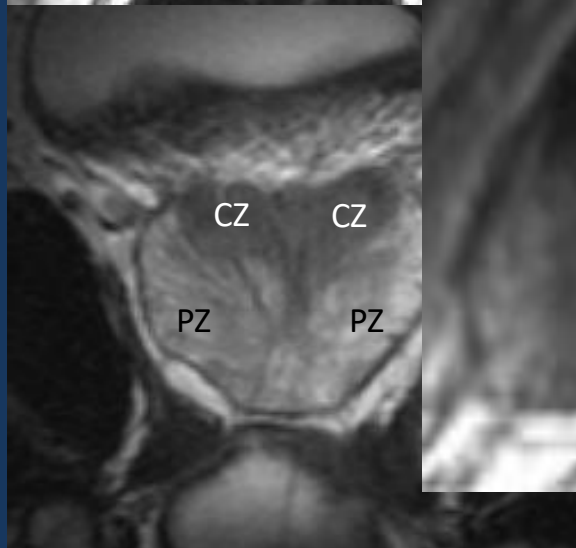
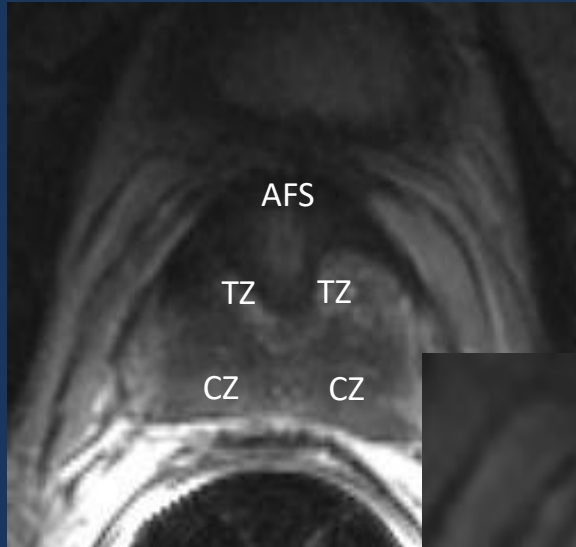
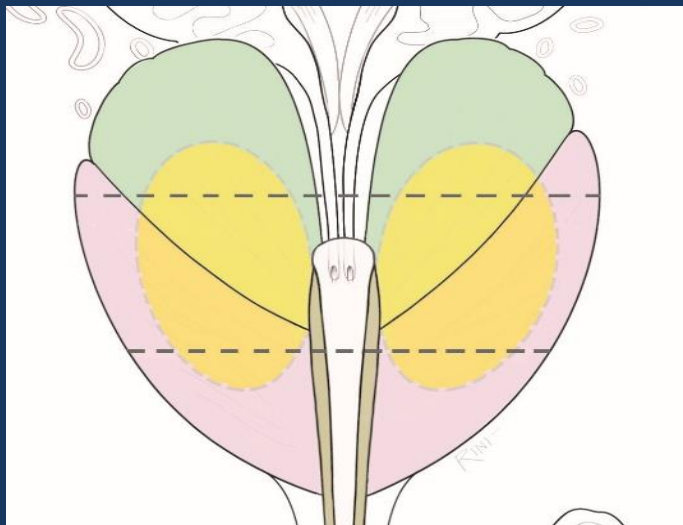
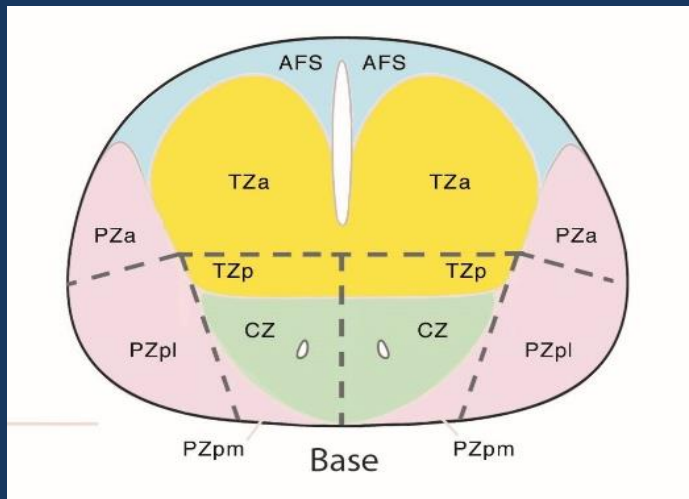
- **70%-75%** of prostate cancers originate in **PZ**
- 20%-30% in TZ
- Cancers originating in CZ are uncommon < 5% and most are secondary to invasion by PZ tumors
- Primary CZ cancers are significantly more aggressive than PZ or TZ cancers
 - greater risk of extracapsular extension, seminal vesicle invasion and positive surgical margins

Multifocality, volume and location of prostate cancers



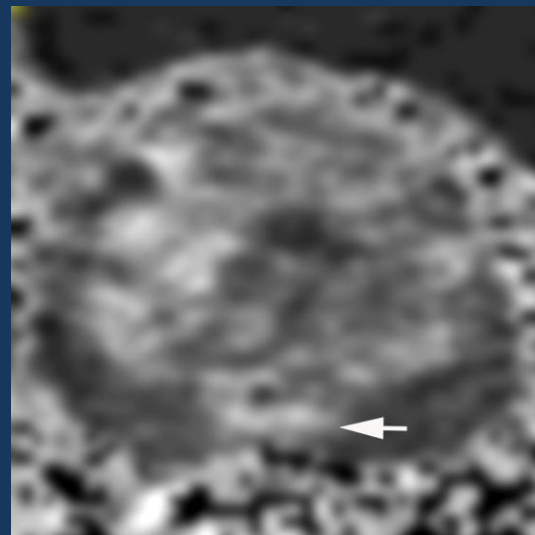
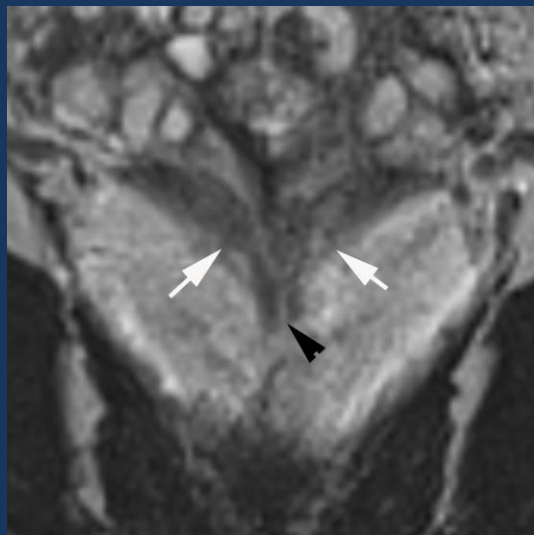
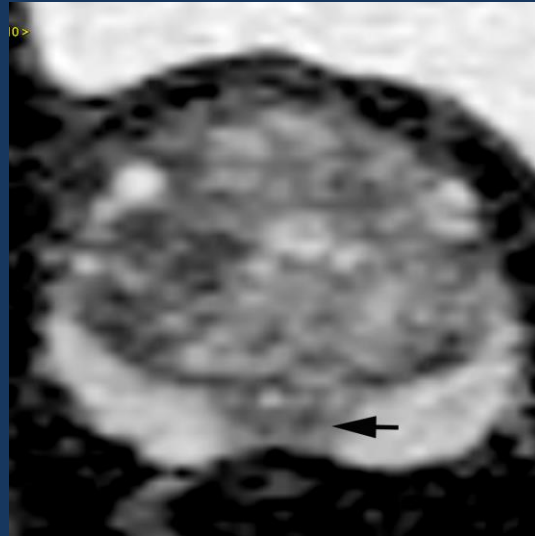
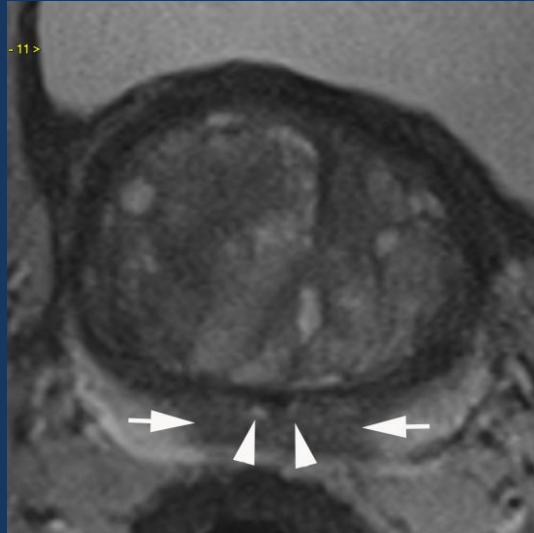
Nevoux P et al. Quantitative tissue analyses of prostate cancer foci in an unselected cystoprostatectomy series. BJUI 2012; 110(4):517-523

Prostate Central Zone

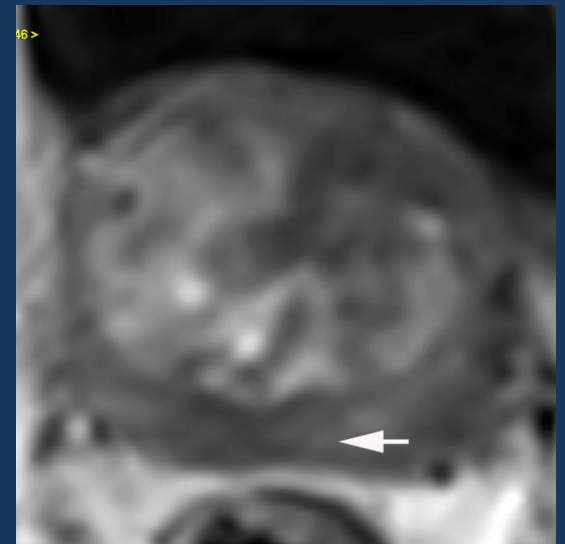


Central Zone (CZ)
Peripheral Zone (PZ)
Transition Zone (TZ)
Anterior Fibromuscular Stroma (AFS)

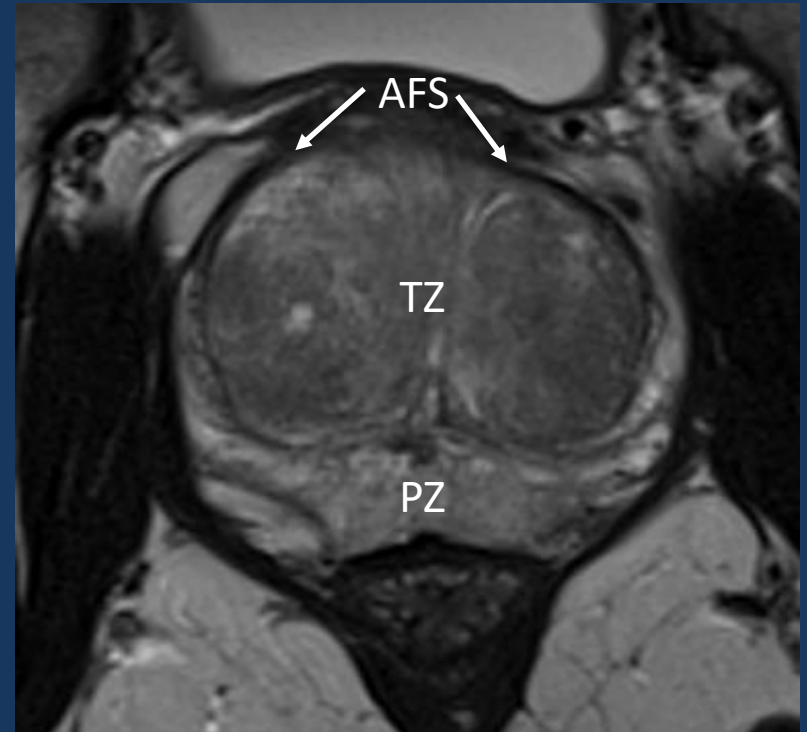
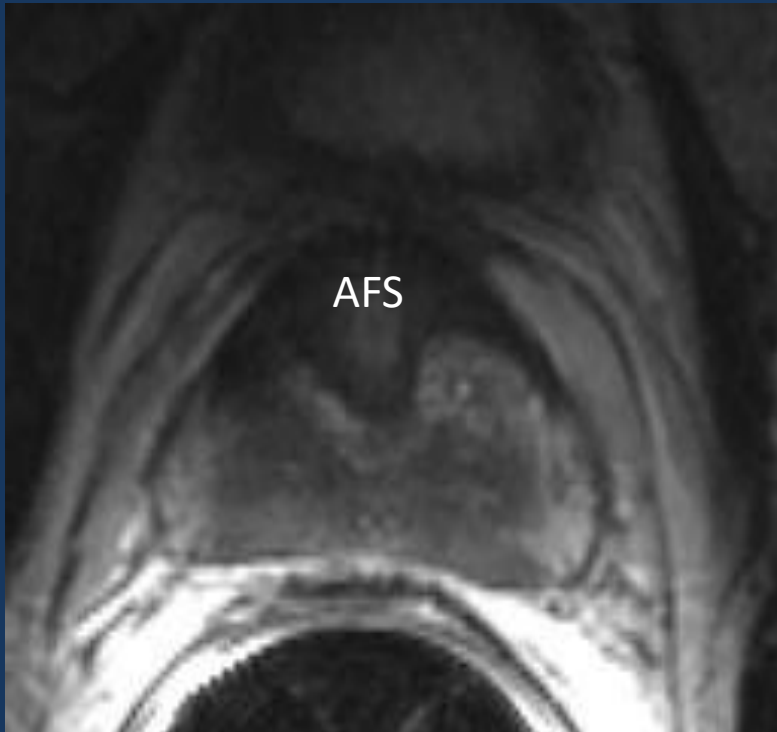
Normal Central Zone



Symmetric !

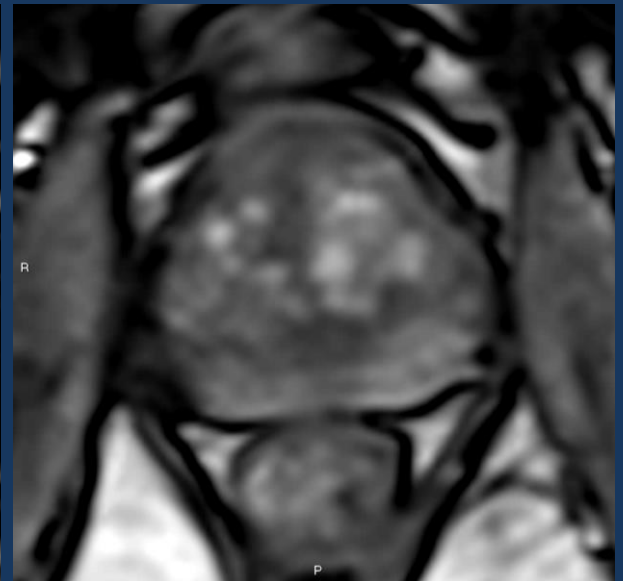
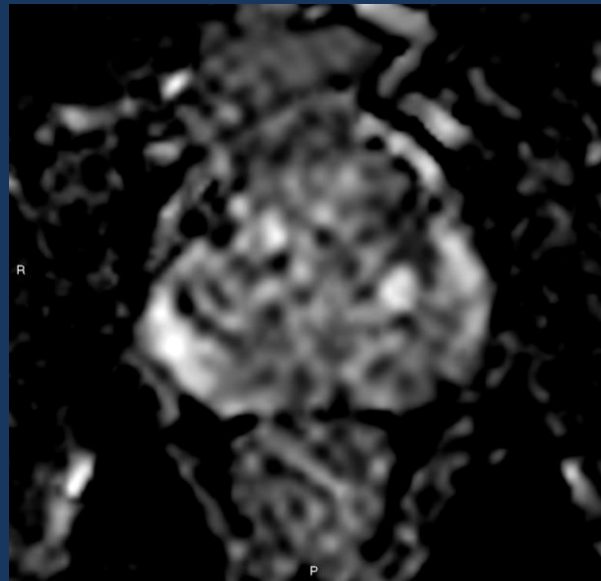
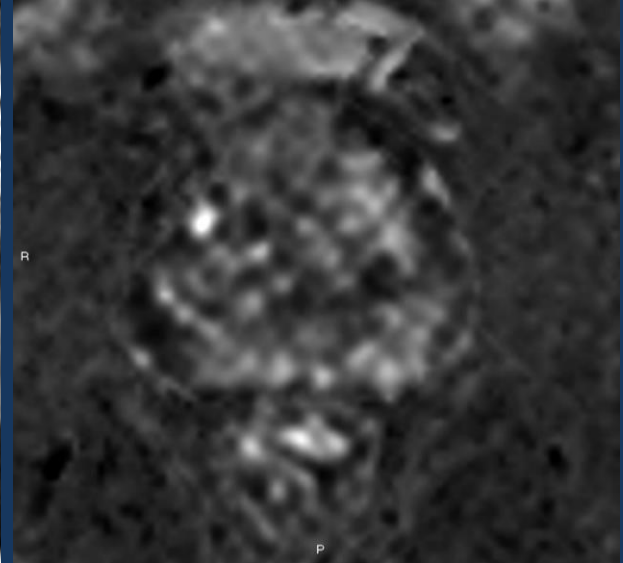
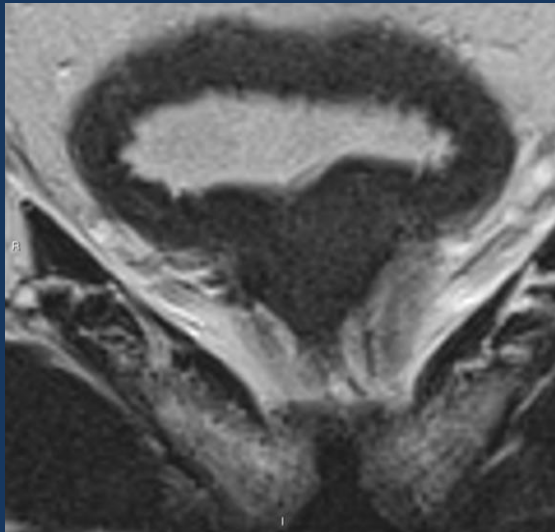
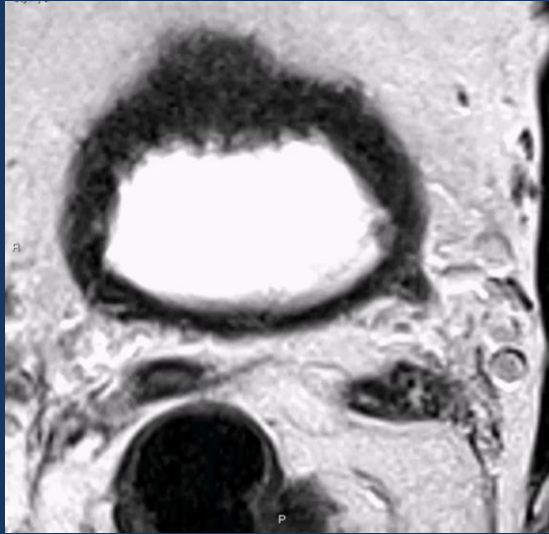


Prostate Zonal Anatomy

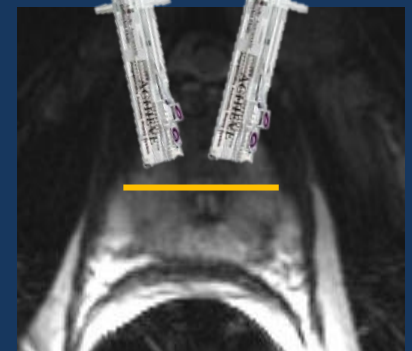
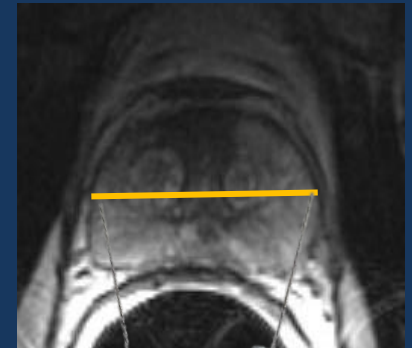
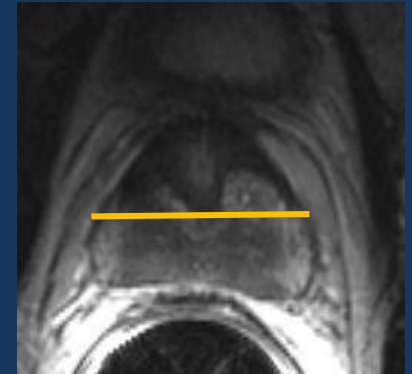
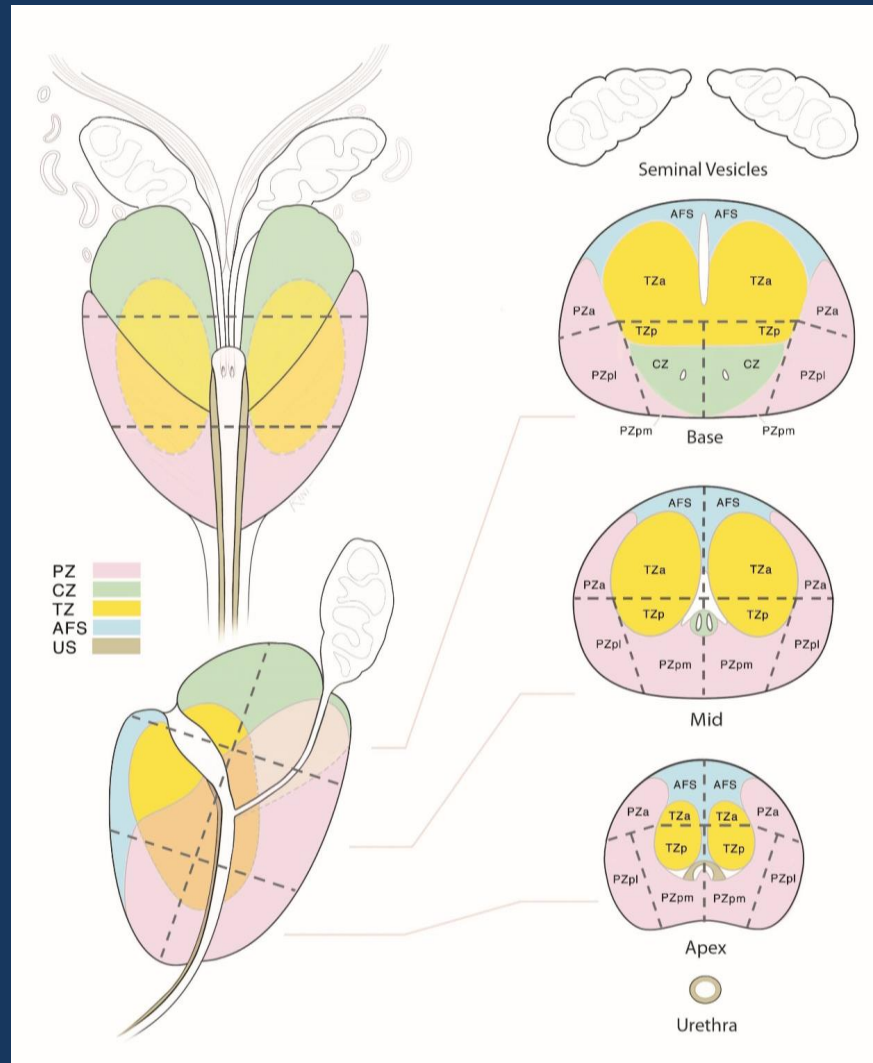
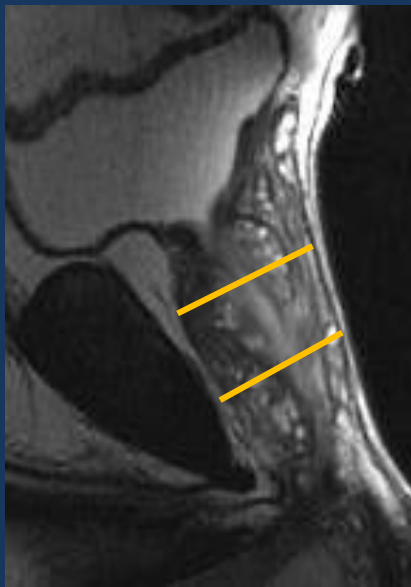
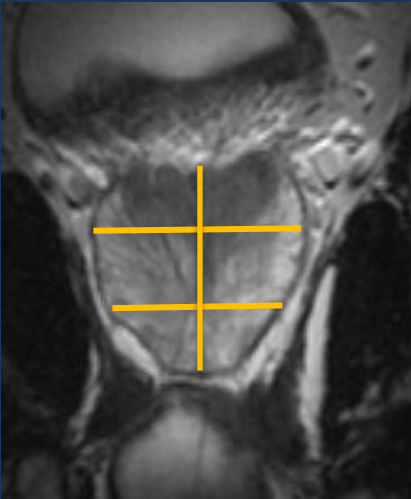


Anterior Fibromuscular Stroma (AFS)
Transition Zone (TZ)

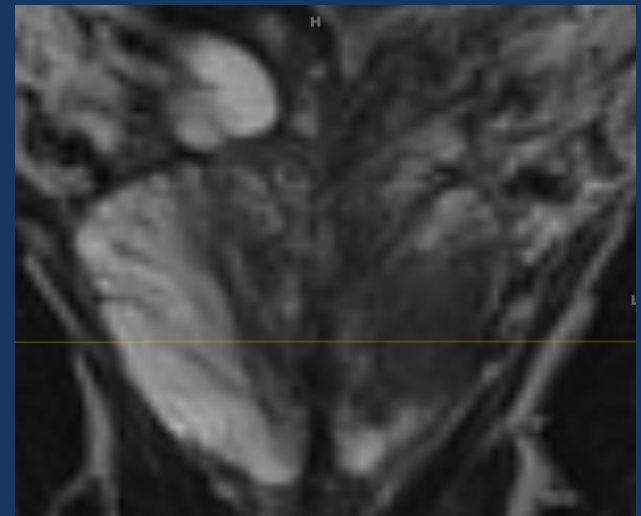
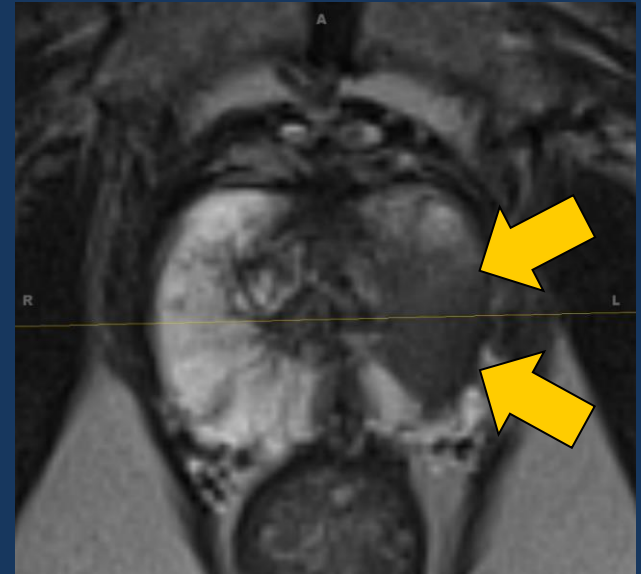
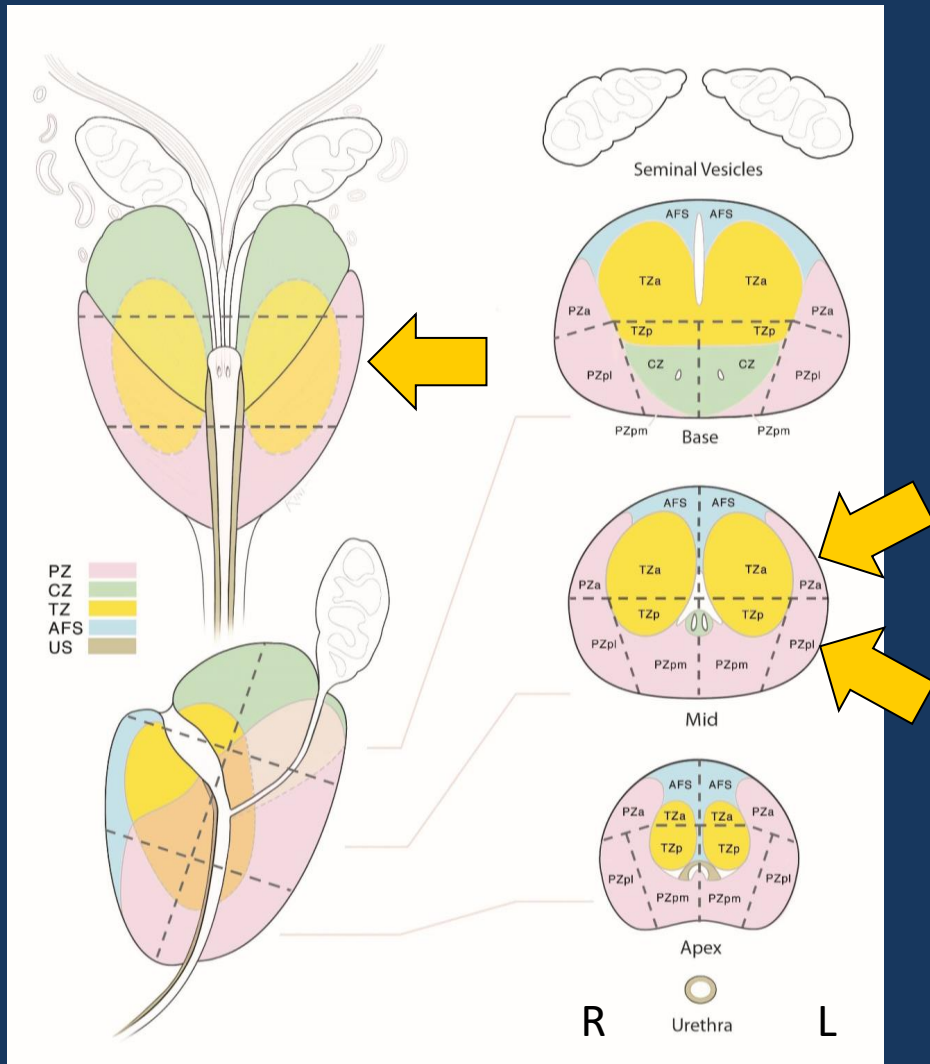
AFS & US



Prostate Anatomy: Sectors (38)



Prostate Anatomy: Sectors (38)

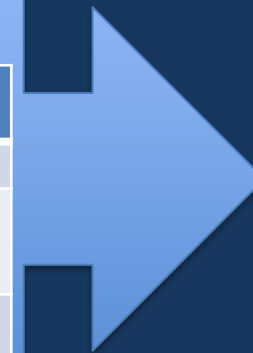


Step-by-step Assessment

2

Qualitative
Evaluation on
T2WI, DWI
(1-5 score)
and DCE
(positive/negative)

Score	Peripheral Zone (PZ)
1	Uniformly hyperintense (normal)
2	Linear, wedge-shaped, or diffuse mild hypointensity, usually indistinct margin
3	Non-circumscribed, rounded, mild hypointensity
4	Circumscribed, homogenous moderate hypointense focus/mass confined to prostate and <1.5 cm in greatest dimension
5	Same as 4 but ≥1.5cm in greatest dimension or definite extraprostatic extension/invasive behavior



Peripheral Zone

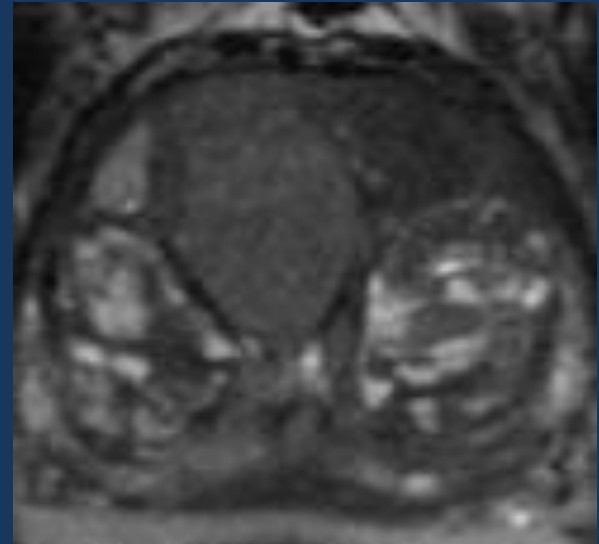
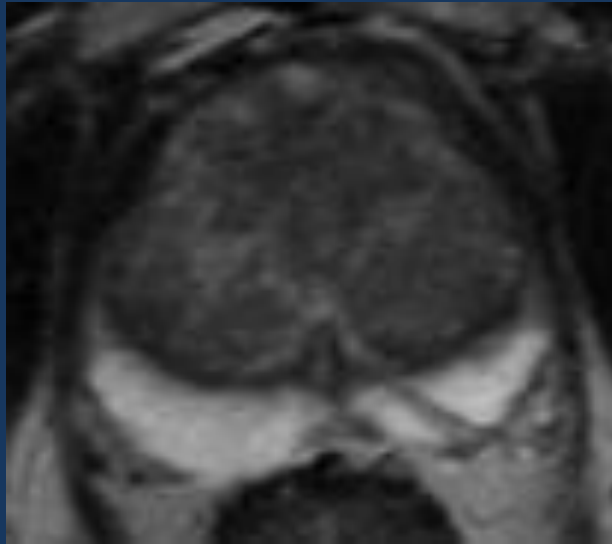
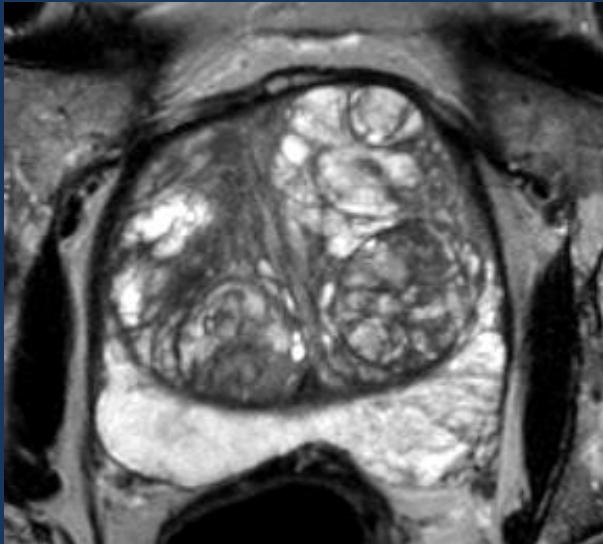
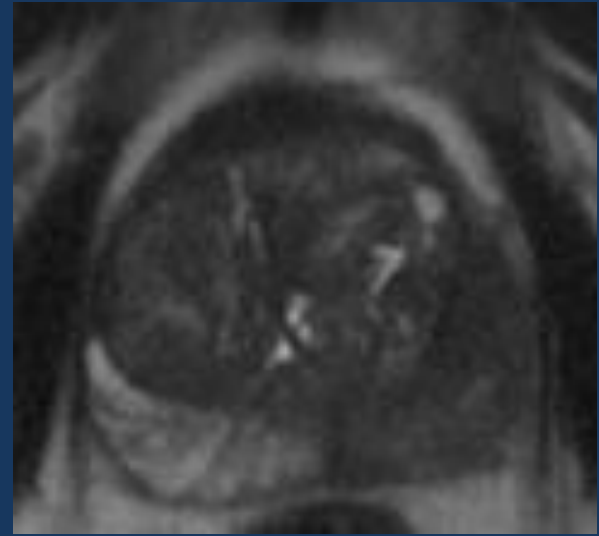
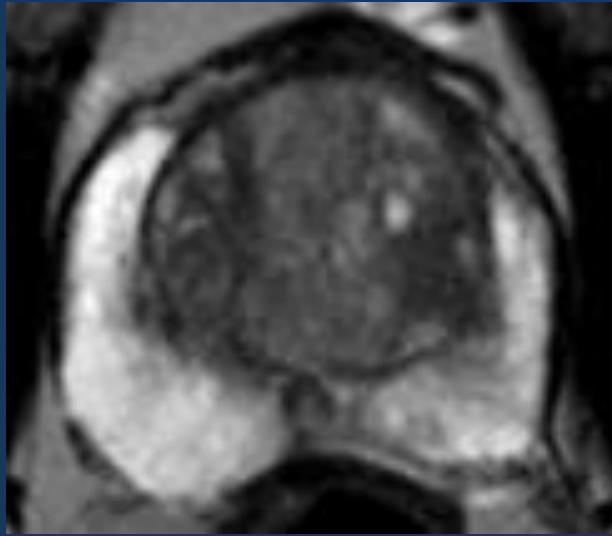
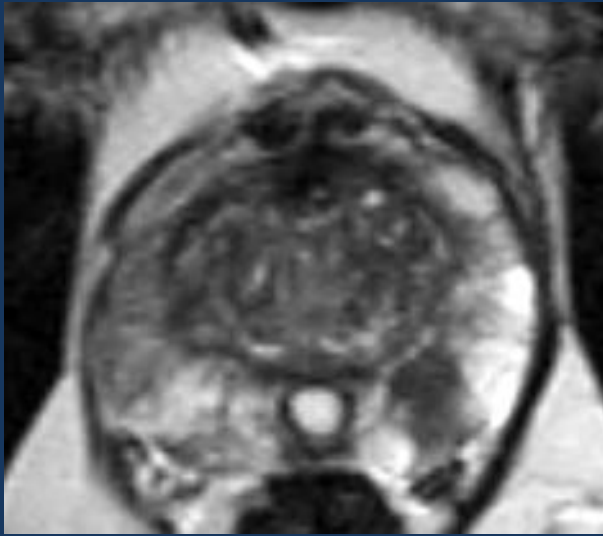
Transition Zone

*Central Zone

*AFS

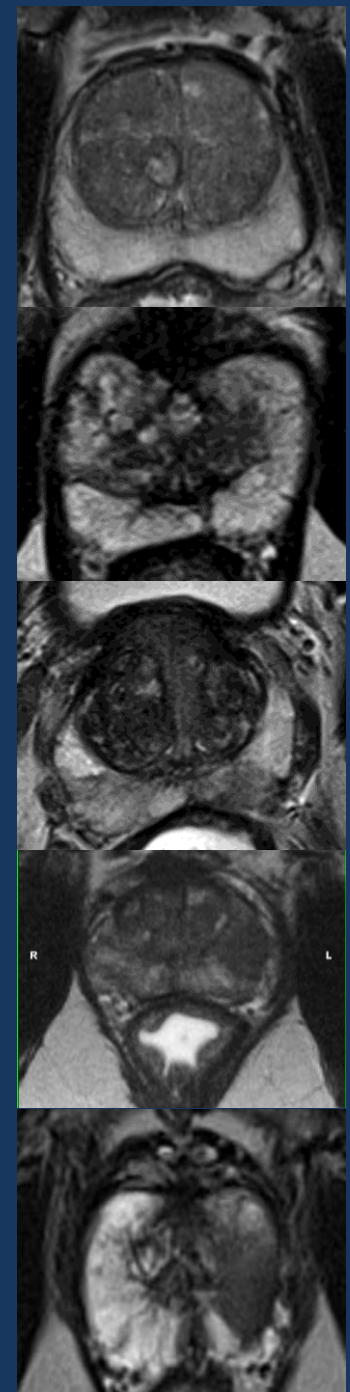
T2-weighted imaging

Signal Intensity: Mildly → Moderately or Markedly



PI-RADS Peripheral Zone T2WI

Score	Peripheral Zone (PZ)
1	Uniformly hyperintense (normal)
2	Linear, wedge-shaped, or diffuse mild hypointensity, usually indistinct margin
3	Non-circumscribed, rounded, mild to moderate hypointensity
4	Circumscribed, homogenous moderate hypointense focus/mass confined to prostate and <1.5 cm in greatest dimension
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior



1

2

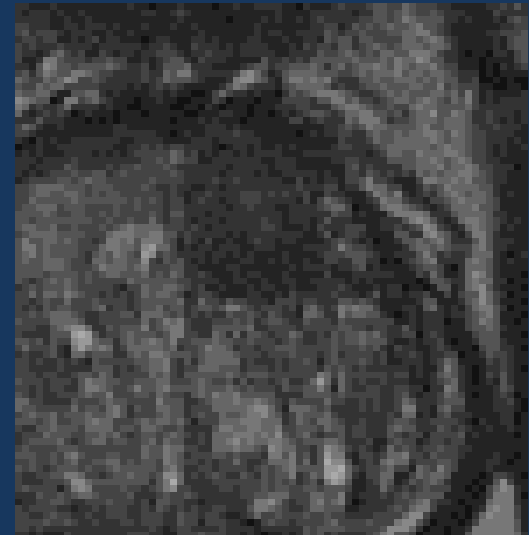
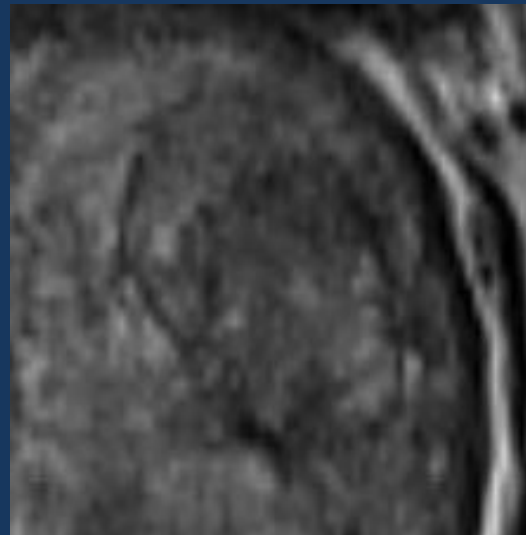
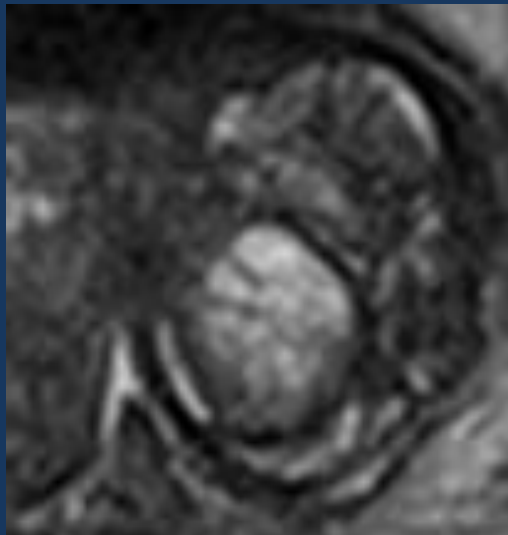
3

4

5

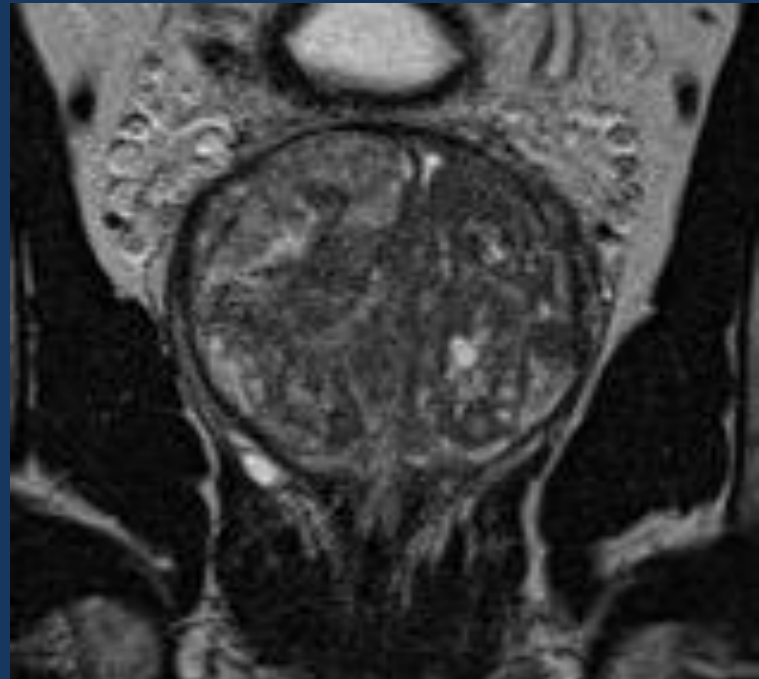
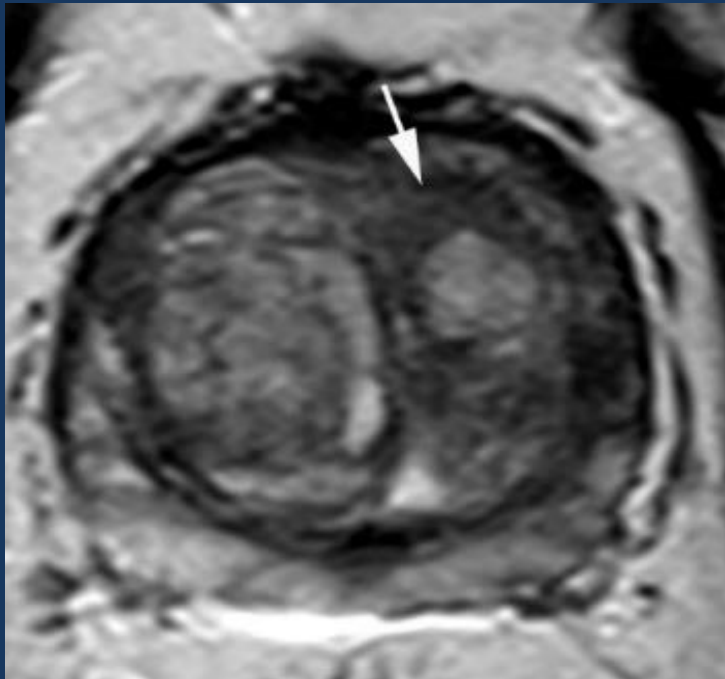
PI-RADS v2.1 Transition Zone T2WI

- Normal appearing TZ (rare) - homogeneous intermediate signal intensity, OR a round, completely encapsulated “typical nodule” – score 1
- A mostly encapsulated nodule OR a homogeneous circumscribed nodule without encapsulation “atypical nodule” - score 2

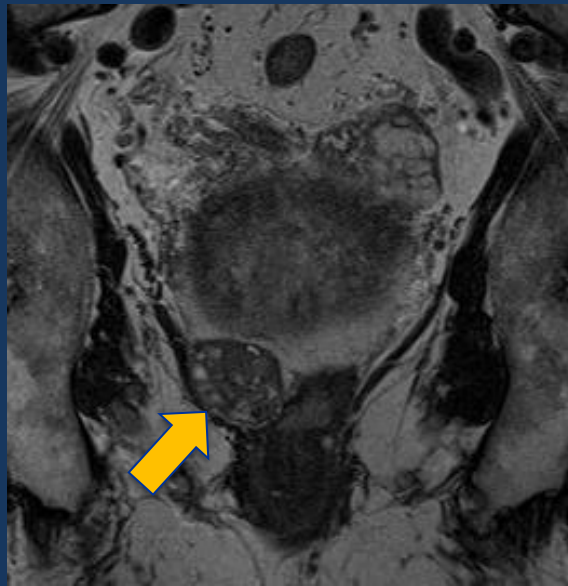
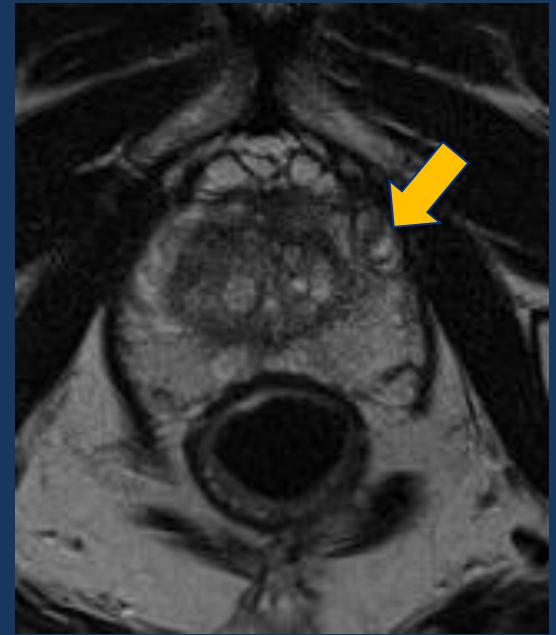
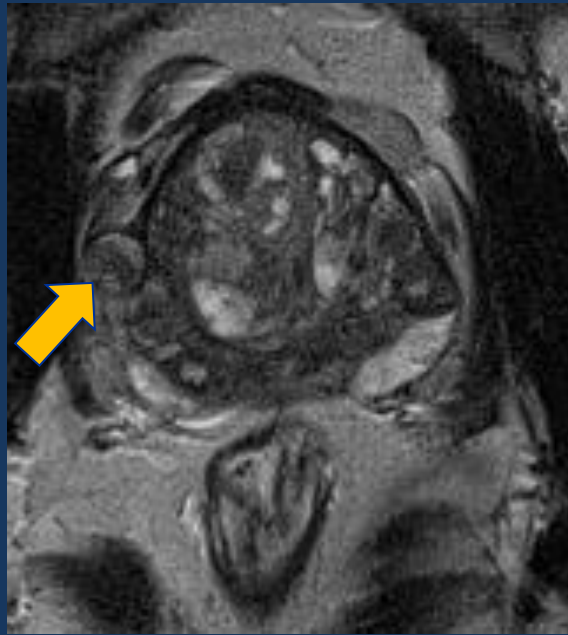


PI-RADS v2.1 Transition Zone T2WI

- OR a homogeneous mildly hypointense area between nodules – score 2

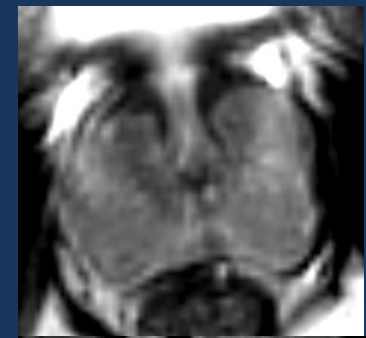


Extruded BPH (*ectopic* BPH)

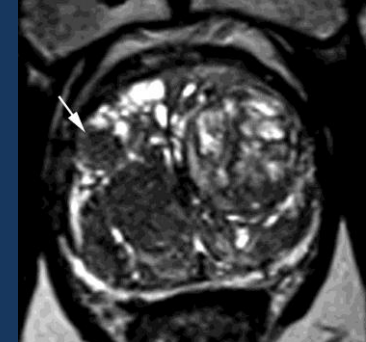


PI-RADS Transition Zone T2WI

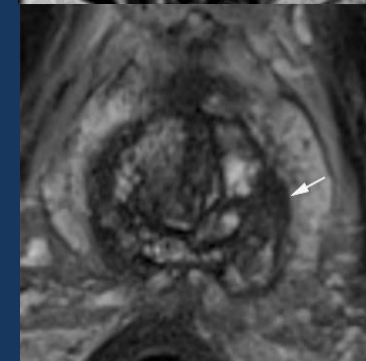
Score	Transition Zone (TZ)
1	Normal appearing - homogeneous intermediate signal intensity (rare), OR a round, completely encapsulated nodule (“typical nodule”)
2	A mostly encapsulated nodule OR a homogeneous circumscribed nodule without encapsulation (“ atypical nodule ”) OR a homogeneous mildly hypointense area between nodules
3	Heterogeneous signal intensity with obscured margins, others that do not qualify as 2, 4, or 5
4	Lenticular or non-circumscribed, homogeneous , moderately hypointense , and <1.5 cm in greatest dimension
5	Same as 4, but $\geq 1.5\text{cm}$ in greatest dimension or definite extraprostatic extension/invasive behavior



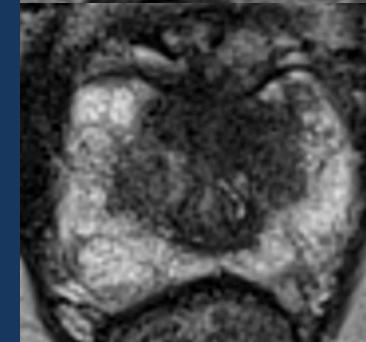
1



2



3

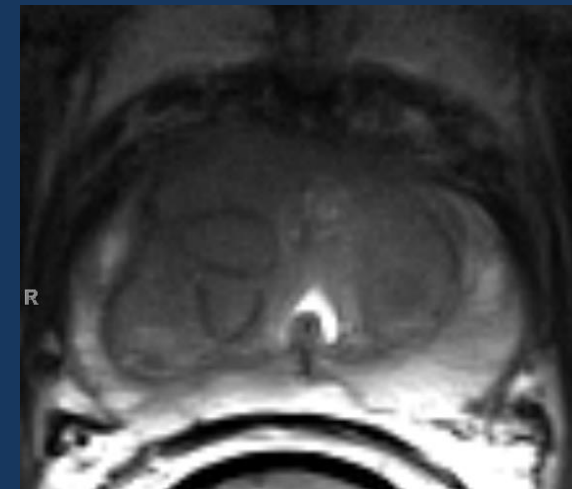
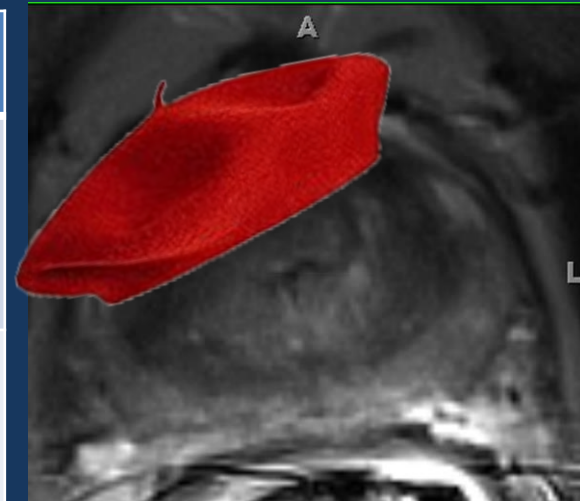


4-5

PI-RADS Transition Zone T2WI

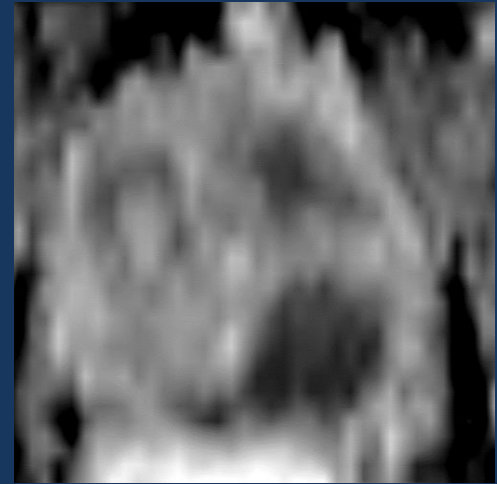
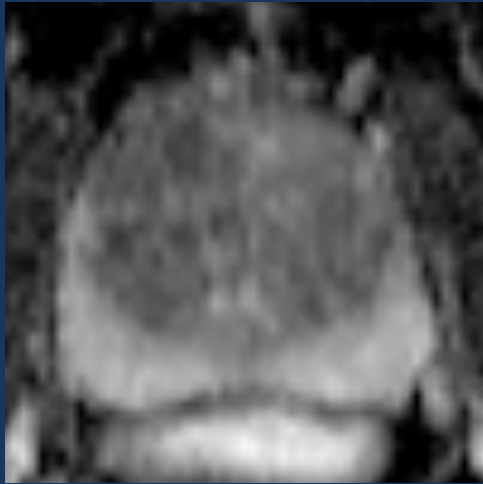
“French-Beret”

Score	Transition Zone (TZ)
4	Lenticular or non-circumscribed, homogeneous, moderately hypointense, and <1.5 cm in greatest dimension
5	Same as 4, but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

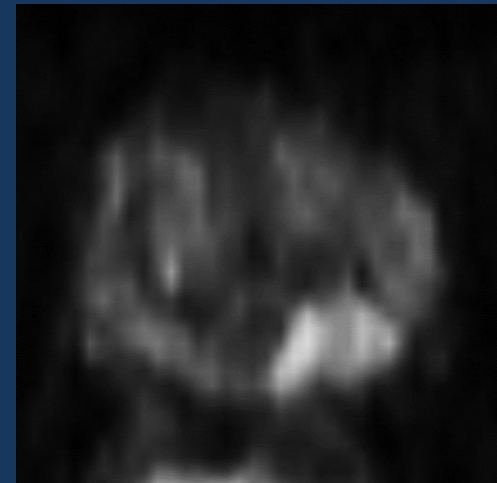
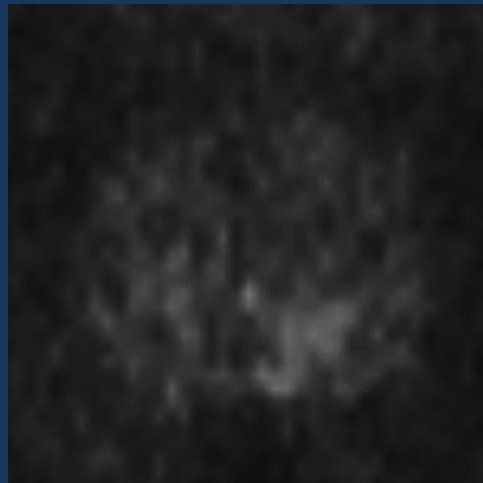
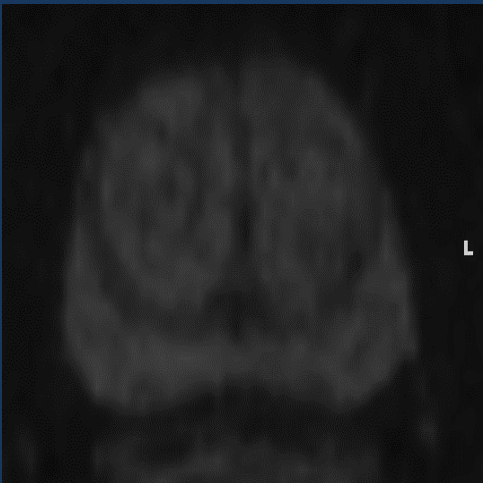


Diffusion-weighted imaging

Signal Intensity: Mildly → Moderately or Markedly



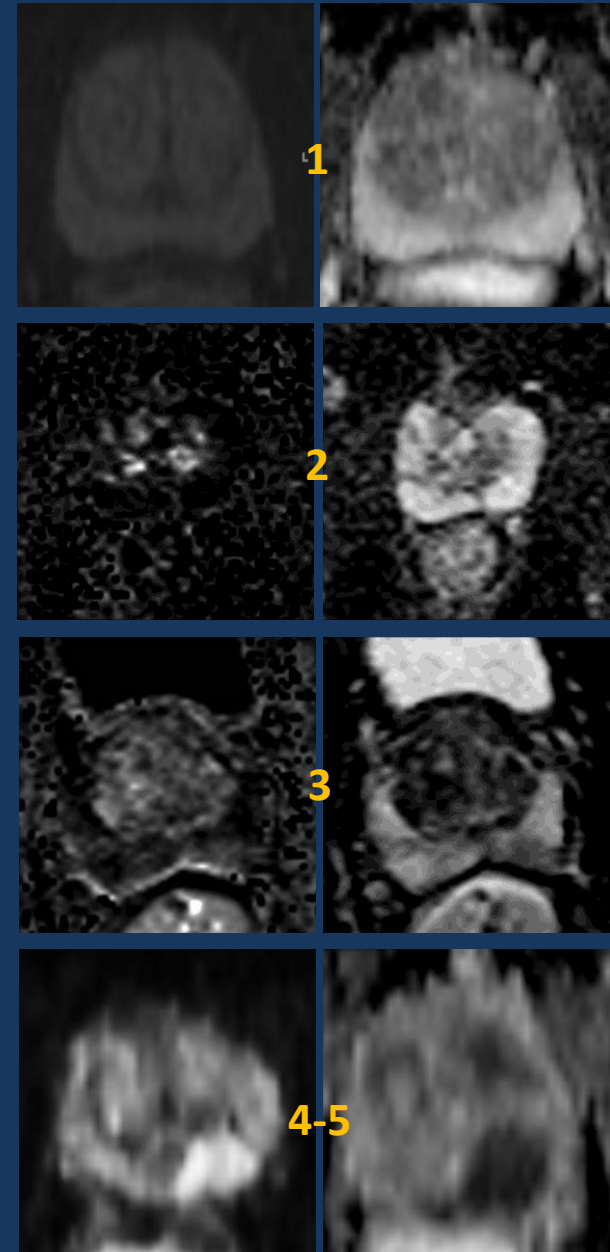
ADC



DWI
b 1400

PI-RADS Peripheral Zone and Transition Zone DWI

Score	Peripheral Zone (PZ)
1	No abnormality (normal) on ADC or high b-value DWI
2	Linear/wedge shaped hypointense on ADC and/or linear/wedge shaped hyperintense on high b-value DWI
3	Focal (discrete and different from the background) hypointense on ADC and/or focal hyperintense on high b-value DWI; may be markedly hypointense on ADC or markedly hyperintense on high b-value DWI, but not both
4	Focal moderately hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm on axial
5	Same as 4 but $\geq 1.5\text{cm}$ in greatest dimension or definite extraprostatic extension/invasive behavior

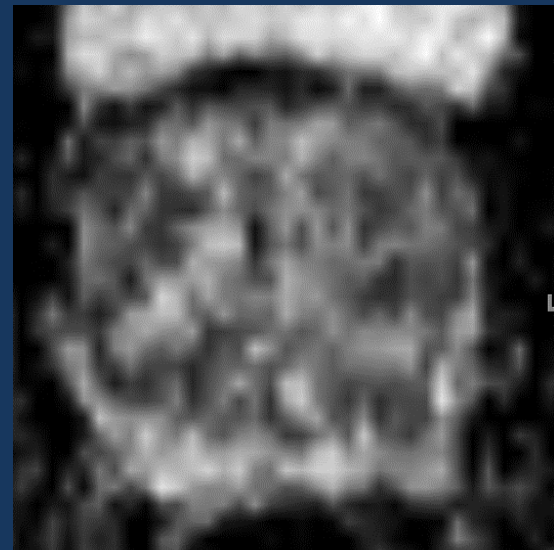
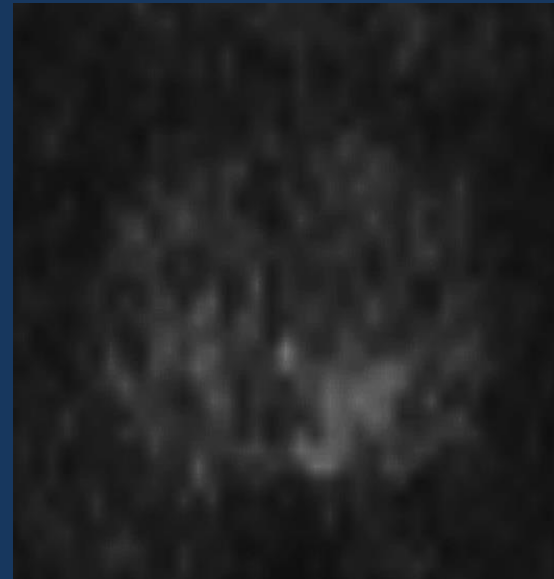


DWI b ≥ 1400

ADC

PI-RADS Transition Zone DWI

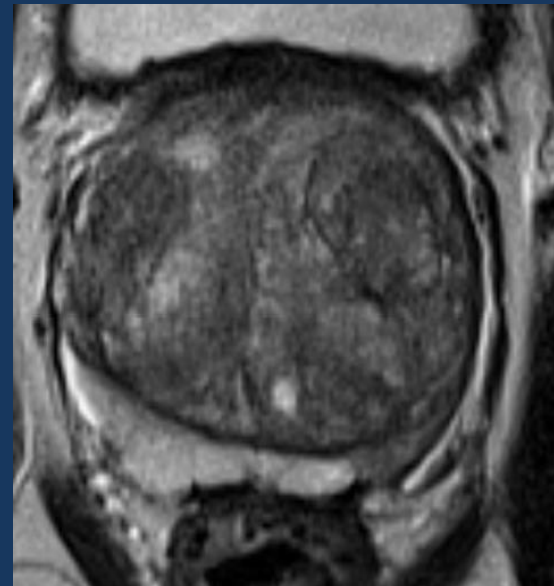
Score	Transition Zone (TZ)
2	Linear/wedge shaped hypointense on ADC and/or linear/wedge shaped hyperintense on high b-value DWI, Non-focal hypointense on ADC and/or hyperintense on high b-value DWI



PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
2	Linear/wedge shaped hypointense on ADC and/or linear/wedge shaped hyperintense on high b-value DWI, Non-focal hypointense on ADC and/or hyperintense on high b-value DWI

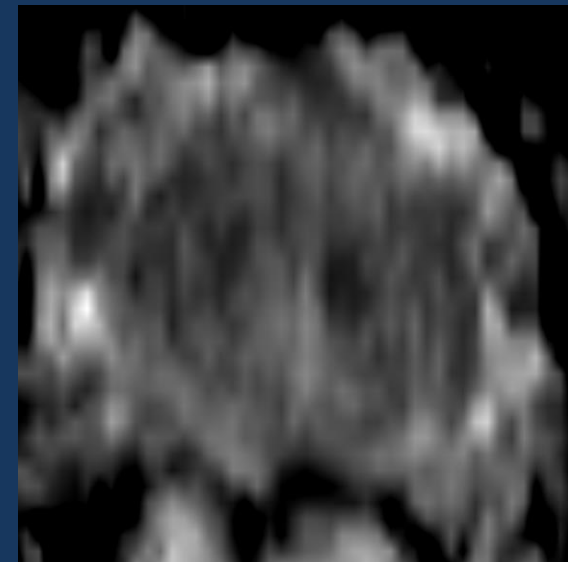
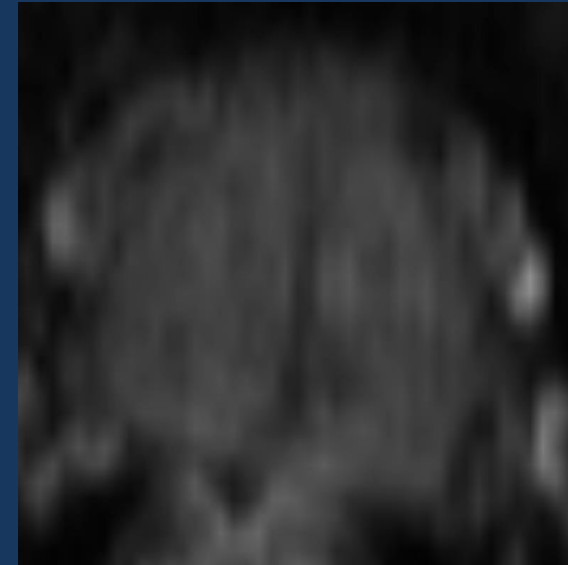
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PI-RADS Transition Zone DWI

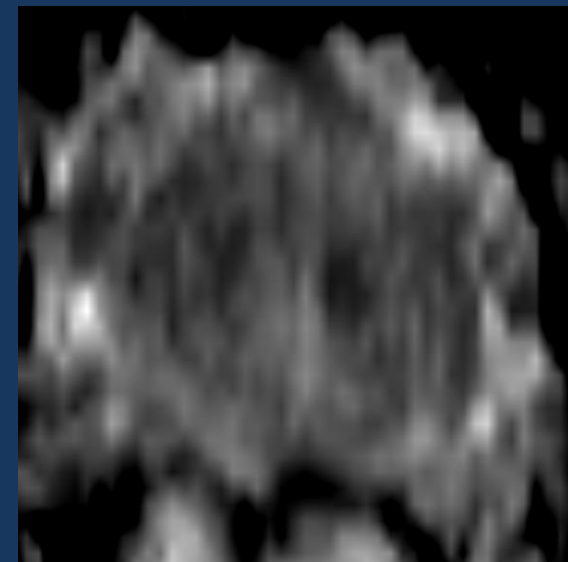
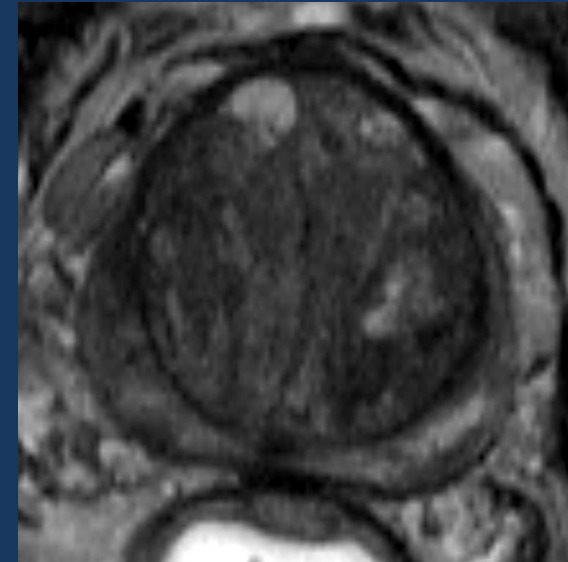
Score	Transition Zone (TZ)
3	Focal (discrete and different from the background) hypointense on ADC and/or focal hyperintense on high b-value DWI; may be markedly hypointense on ADC or markedly hyperintense on high b-value DWI, but not both

FOCAL



PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
3	Focal (discrete and different from the background) hypointense on ADC and/or focal hyperintense on high b-value DWI; may be markedly hypointense on ADC or markedly hyperintense on high b-value DWI, but not both

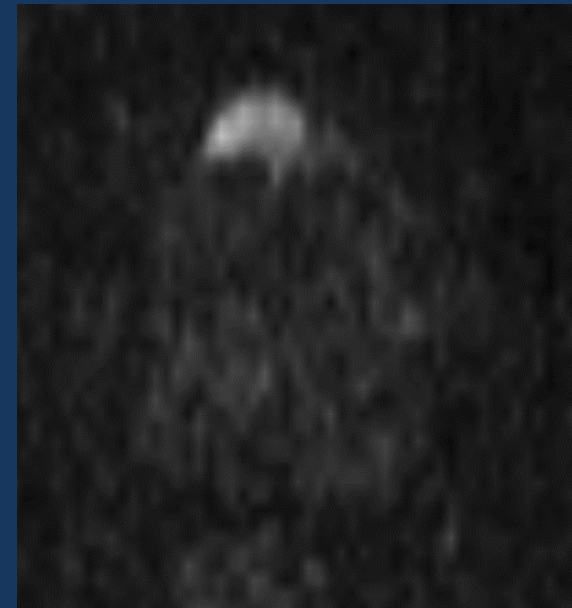


PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
4	Focal moderately hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm on axial
5	Same as 4 but $\geq 1.5\text{cm}$ in greatest dimension or definite extraprostatic extension/invasive behavior

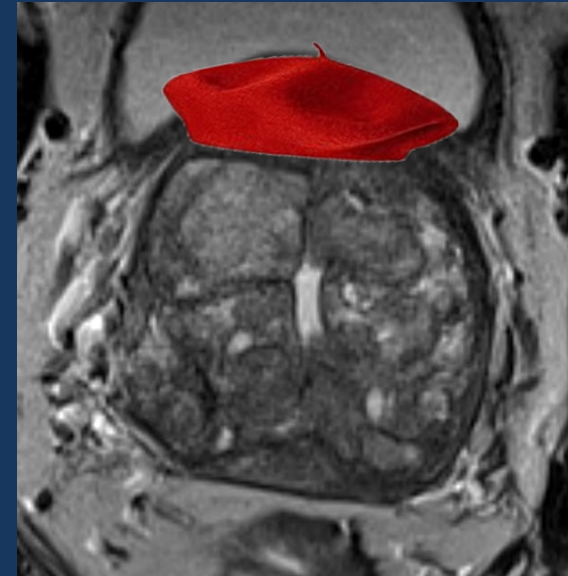


“Black&White”



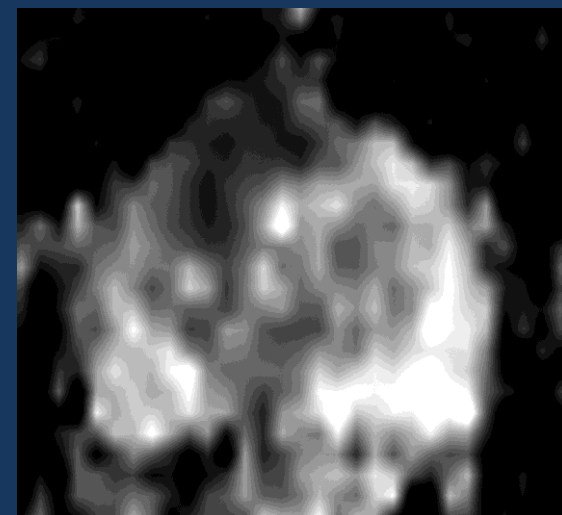
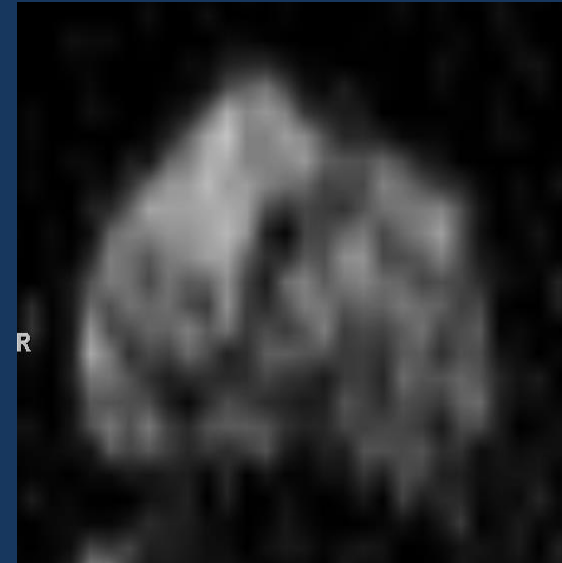
PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
4	Focal moderately hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm on axial
5	Same as 4 but $\geq 1.5\text{cm}$ in greatest dimension or definite extraprostatic extension/invasive behavior



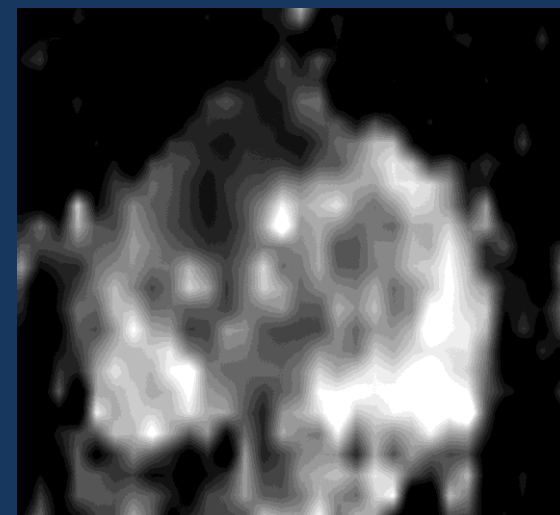
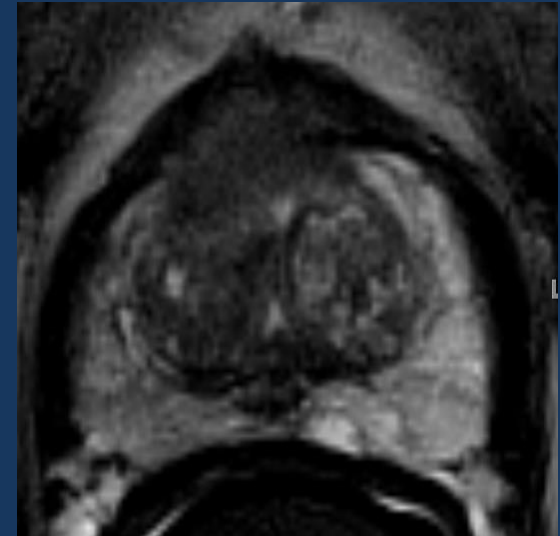
PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
4	Focal moderately hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm on axial
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior



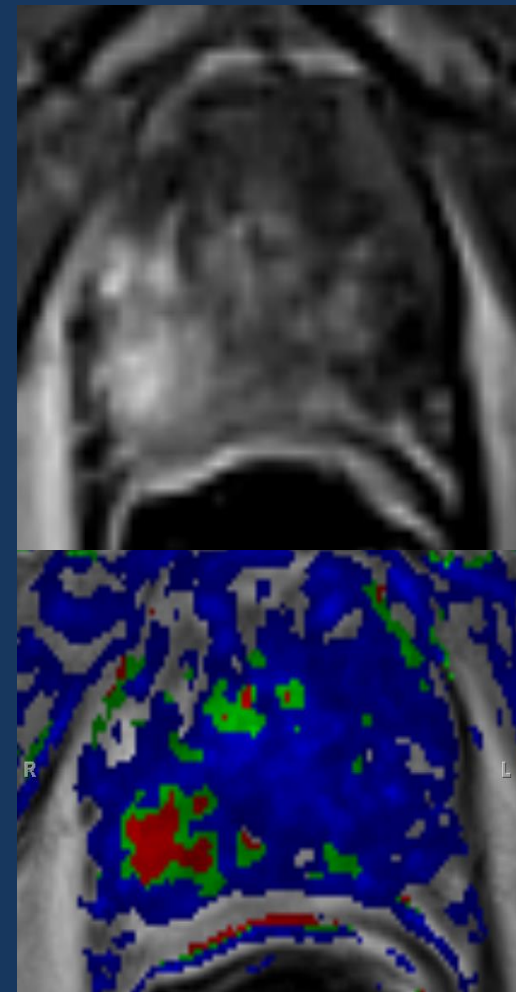
PI-RADS Transition Zone DWI

Score	Transition Zone (TZ)
4	Focal moderately hypointense on ADC and markedly hyperintense on high b-value DWI; <1.5cm on axial
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior



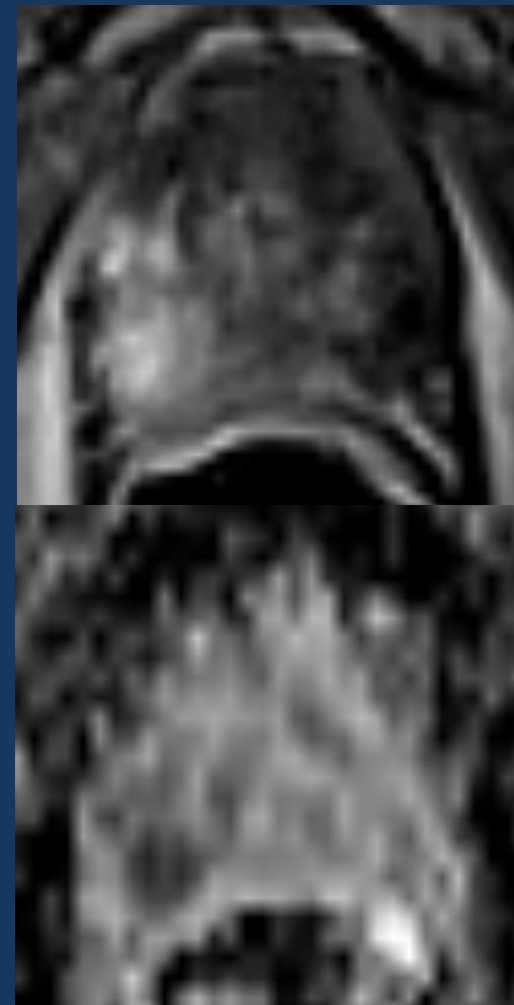
PI-RADS DCE

DCE Status	PZ / TZ Enhancement
Positive (+)	Focal, AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement NOT corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)



PI-RADS DCE

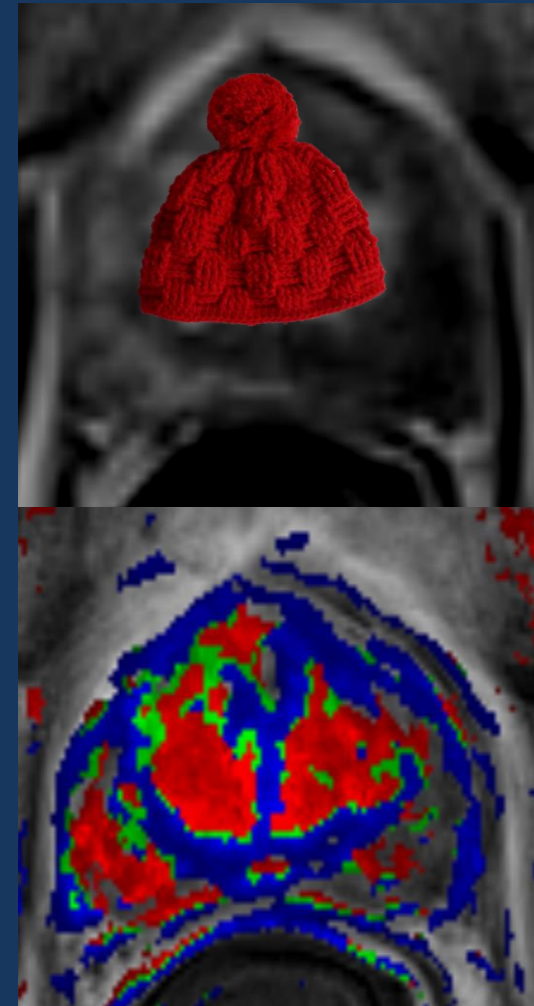
DCE Status	PZ / TZ Enhancement
Positive (+)	Focal, AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement NOT corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)



PI-RADS DCE

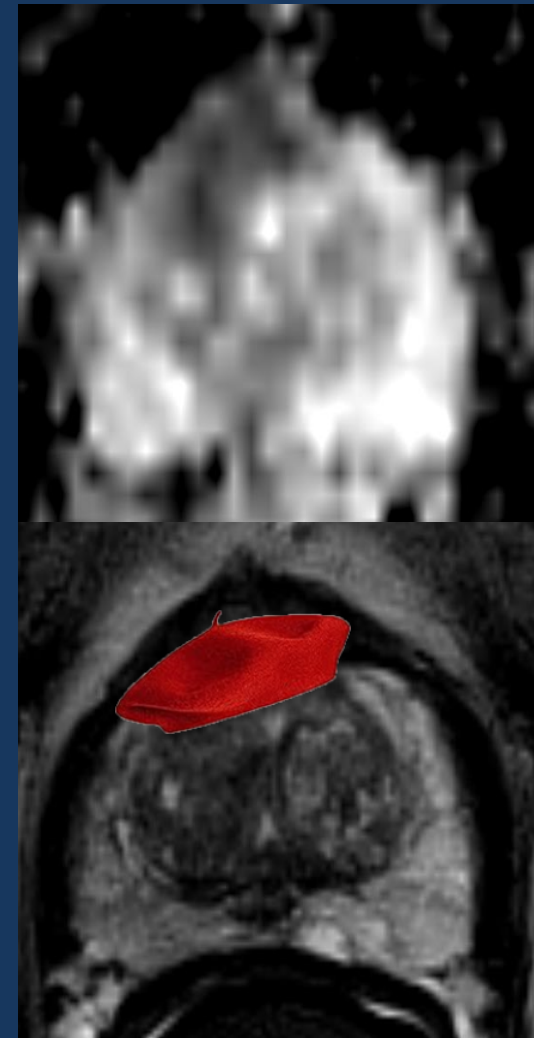
“PomPom Hat”

DCE Status	PZ / TZ Enhancement
Positive (+)	Focal , AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement NOT corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)



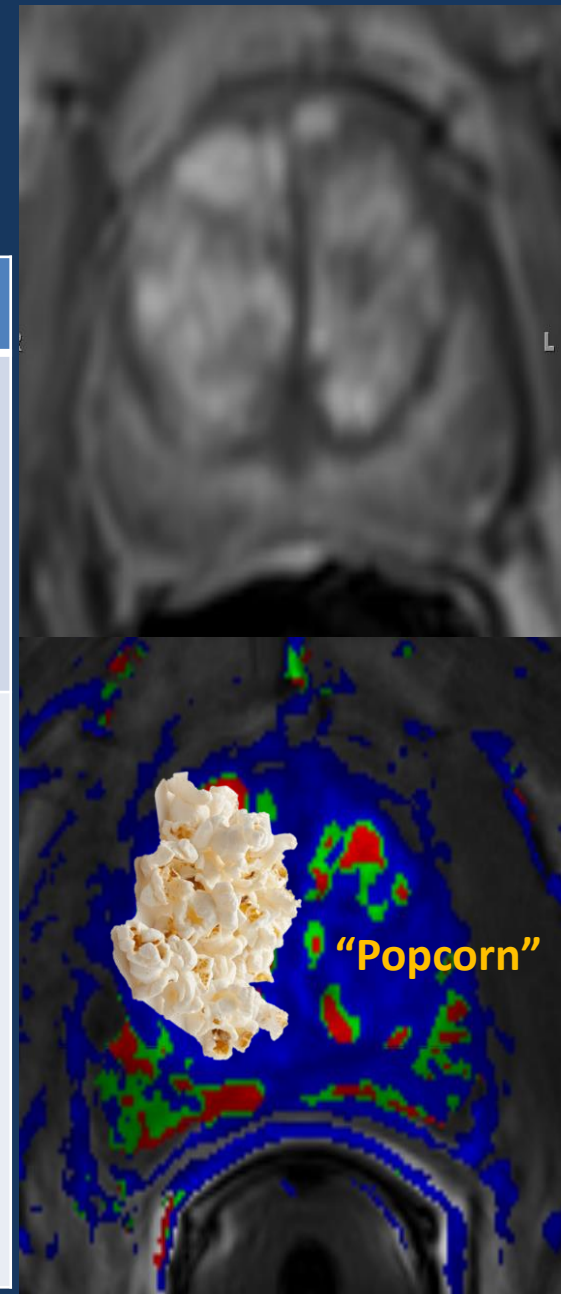
PI-RADS DCE

DCE Status	PZ / TZ Enhancement
Positive (+)	Focal, AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement NOT corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)



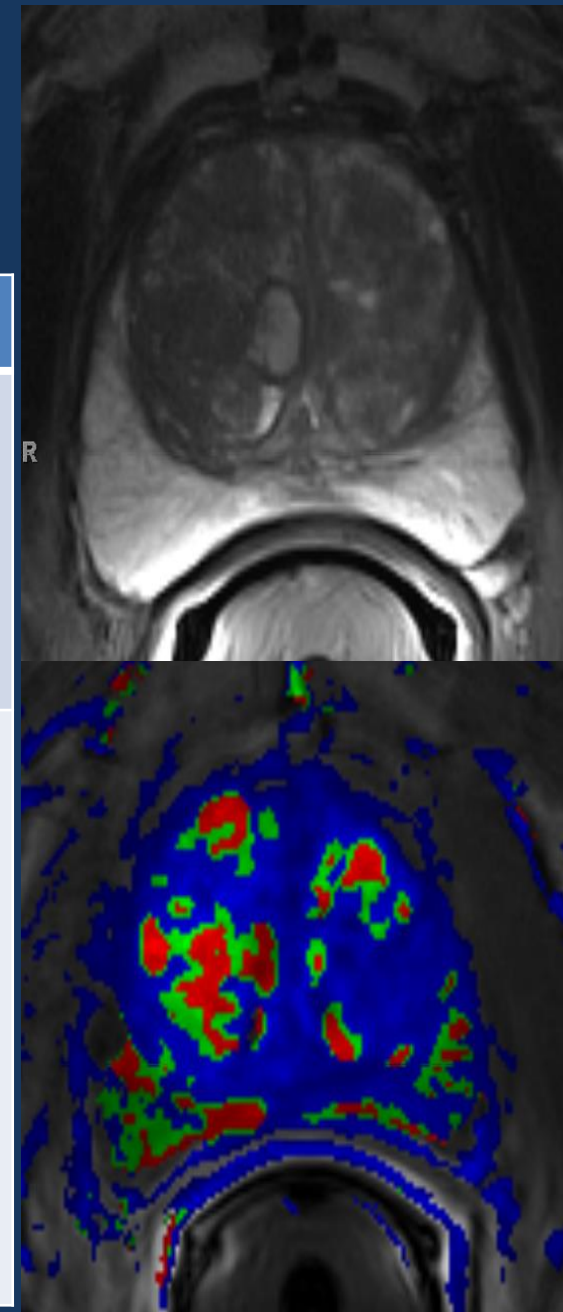
PI-RADS DCE

DCE Status	PZ / TZ Enhancement
Positive (+)	Focal , AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement <u>NOT</u> corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)



PI-RADS DCE

DCE Status	PZ / TZ Enhancement
Positive (+)	Focal , AND earlier than or contemporaneously with enhancement of adjacent normal prostatic tissues, AND corresponds to suspicious finding on T2W and/or DWI
Negative (-)	No early or contemporaneous enhancement; OR diffuse multifocal enhancement <u>NOT</u> corresponding to a focal finding on T2W and/or DWI OR focal enhancement corresponding to a lesion demonstrating features of BPH on T2WI (including features of extruded BPH in the PZ)

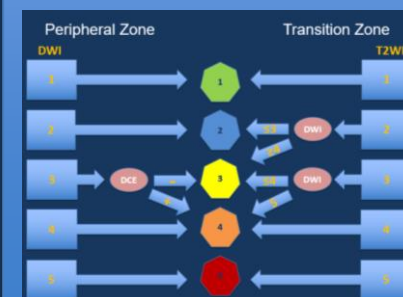


Step-by-step Assessment

3

Overall PI-RADS Assessment

DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



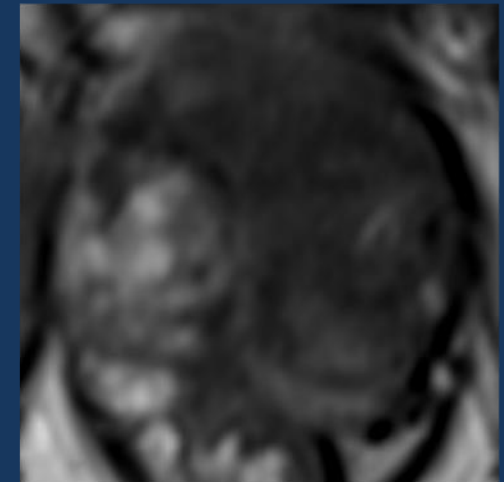
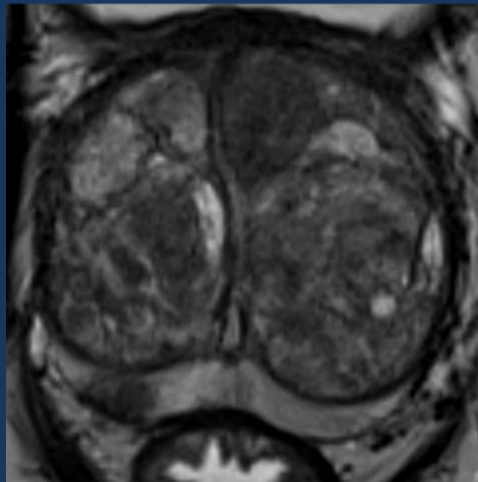
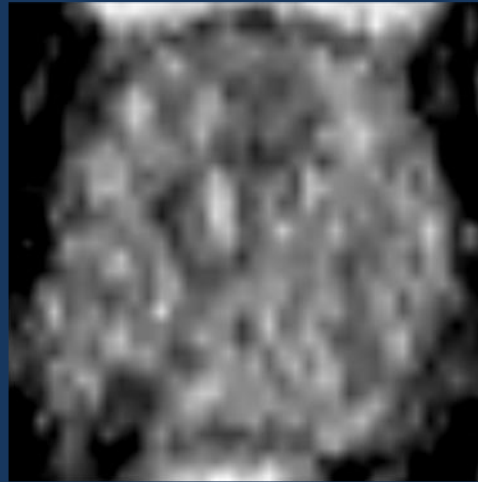
Rule #1 Peripheral Zone: Dominant sequence is **DWI-ADC**
Modifier for score 3: DCE - / **+** → **Overall score 4**

DWI	T2W	DCE	OVERALL
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5

Rule #2 Transition Zone: Dominant sequence is **T2WI**
Modifier for score 2: DWI-ADC $\geq 4 \rightarrow$ **Overall score 3**
Modifier for score 3: DWI-ADC **5** $\rightarrow$ **Overall score 4**

T2W	DWI	DCE	Overall
1	Any	Any	1
2	≤ 3	Any	2
	≥ 4	Any	3
3	≤ 4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5

Overall PI-RADS v2.1 Assessment



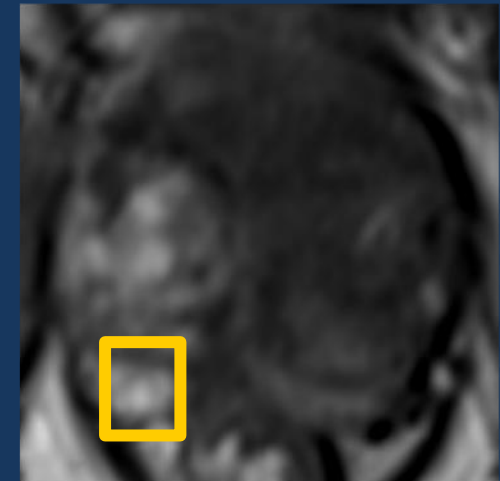
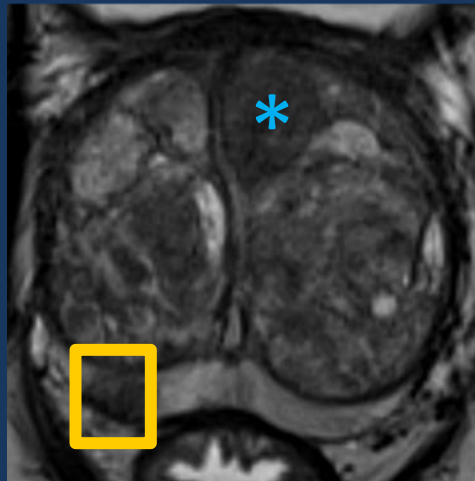
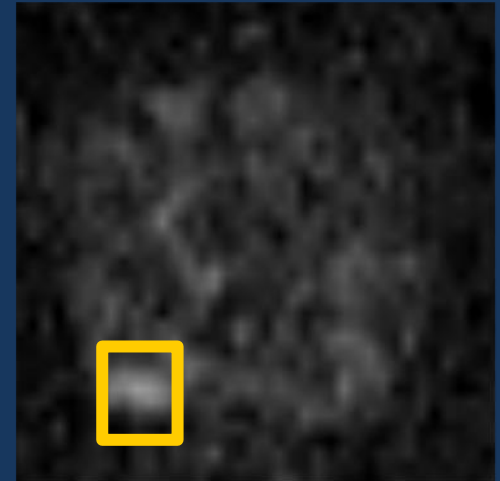
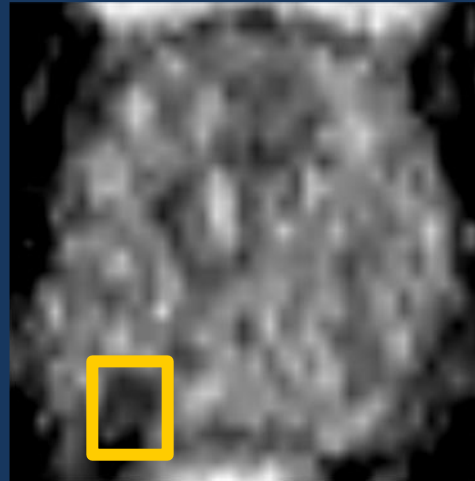
Overall PI-RADS v2.1 Assessment

Peripheral Zone (PZ)



DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5

Nodule 10 mm



Overall PI-RADS v2.1 Assessment

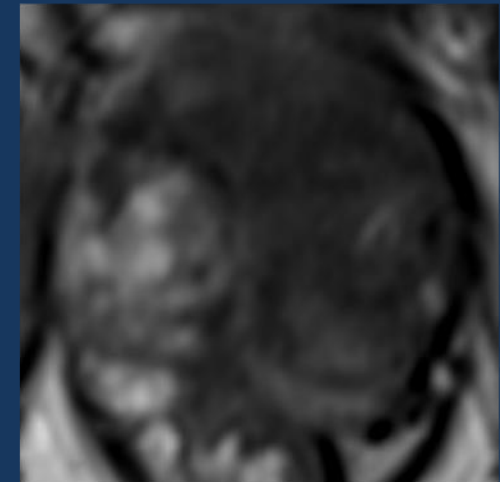
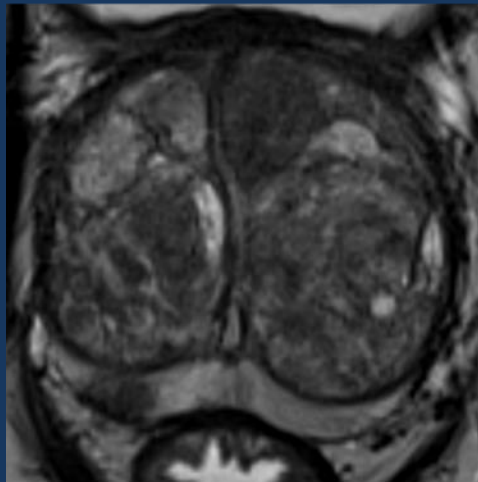
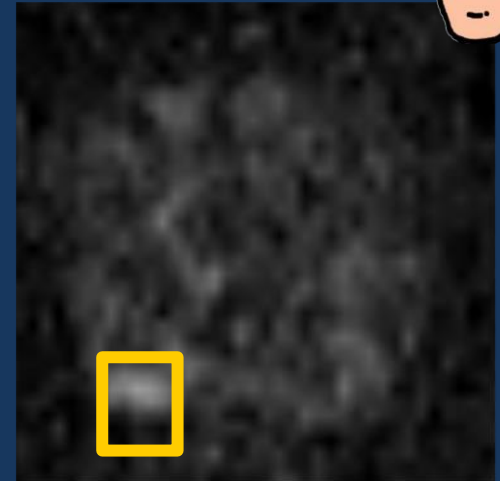
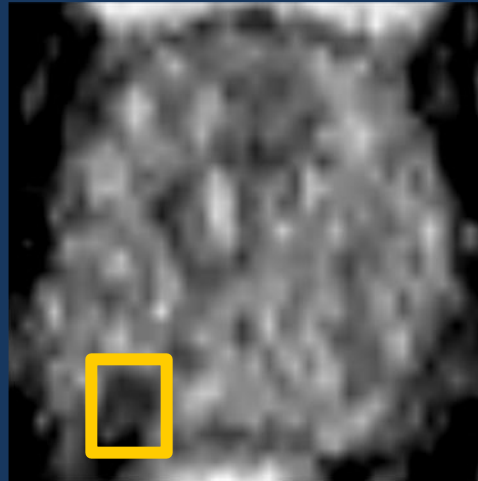
Peripheral Zone (PZ)



Nodule 10 mm

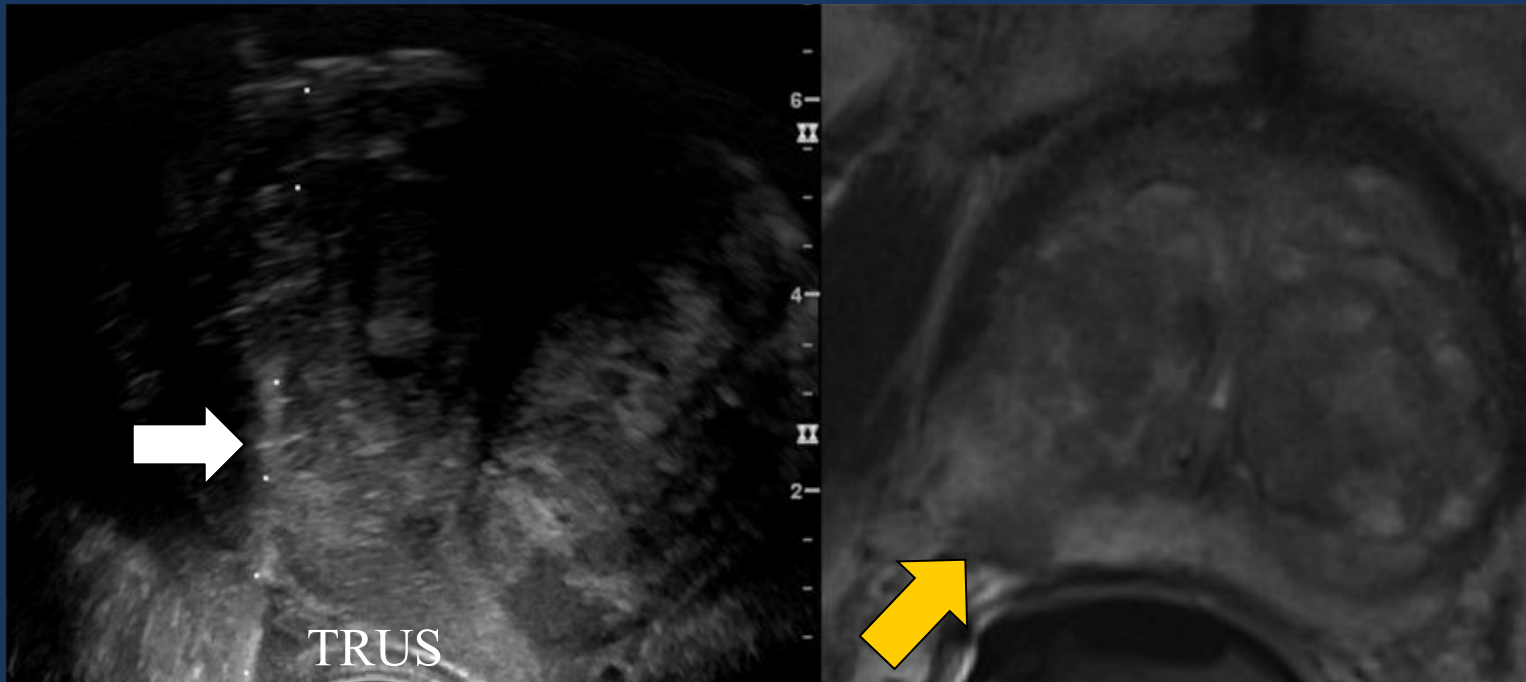


DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



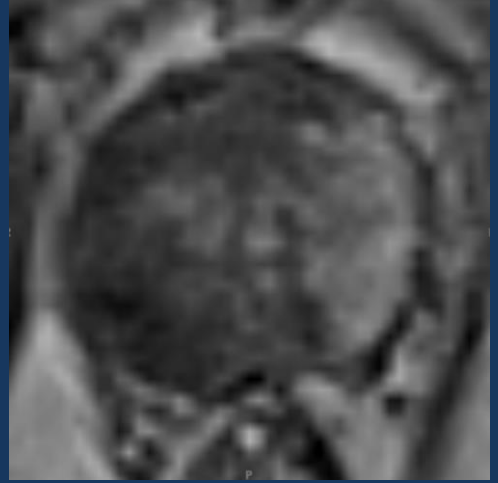
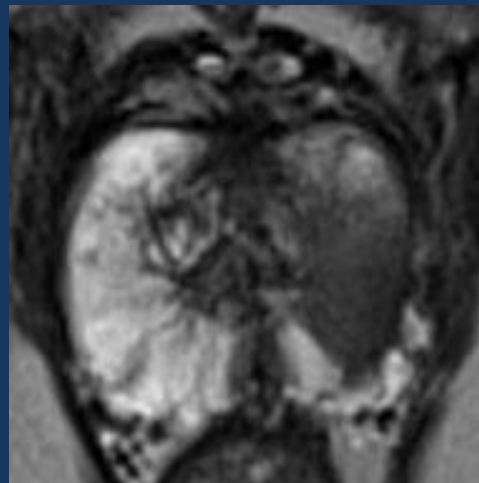
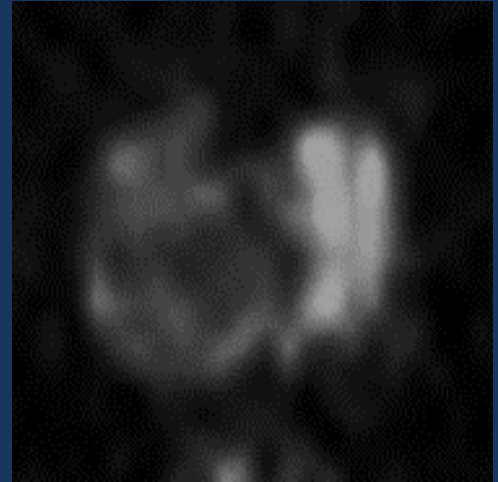
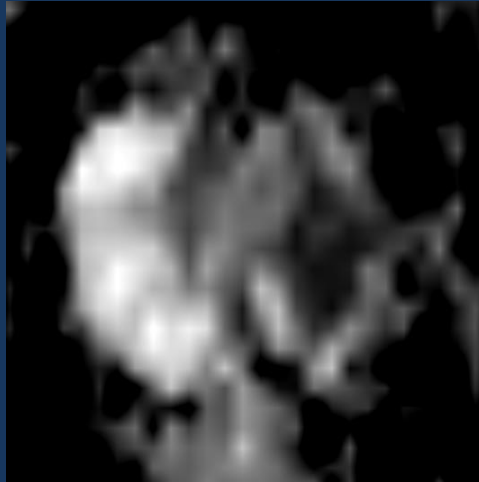
PI-RADS 4: clinically significant cancer is likely

MR-TRUS fusion biopsy



75M, PSA 11 ng/mL (PSAD 0.11) with prior TRUS BX Gleason 3 + 3 = 6 prostate cancer in 2 cores from right peripheral zone. DRE neg. Patient in AS on F-U MRI PI-RADS 4. Targeted BX Gleason score **3+3=6** prostate cancer involving 60% of the core, low risk GG1. No change on F-U mpMRI two years later. Patient remains in AS.

Overall PI-RADS v2.1 Assessment



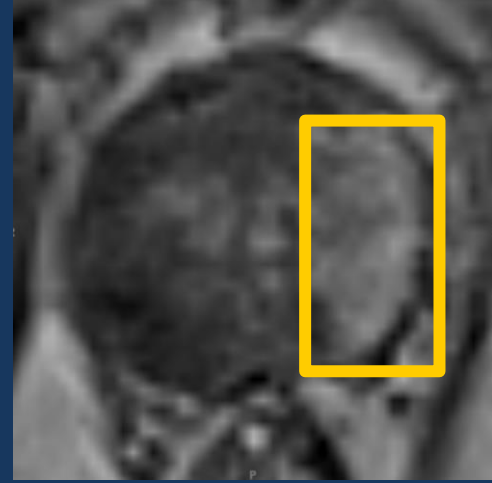
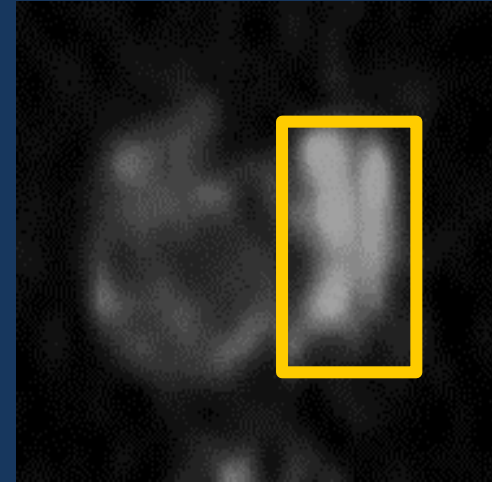
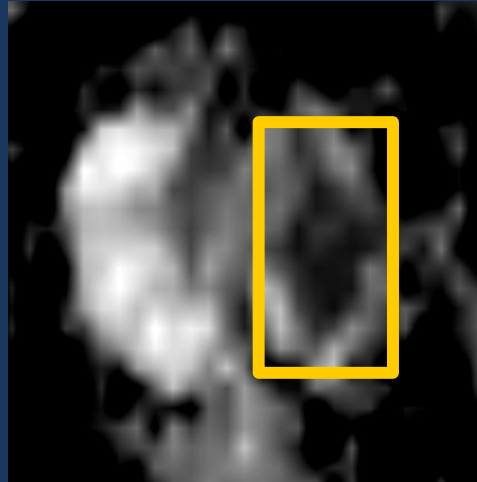
Overall PI-RADS v2.1 Assessment

Peripheral Zone (PZ)

Nodule 20 mm



DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



Overall PI-RADS v2.1 Assessment

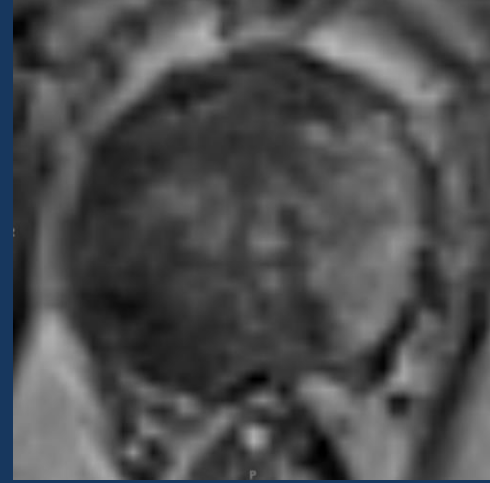
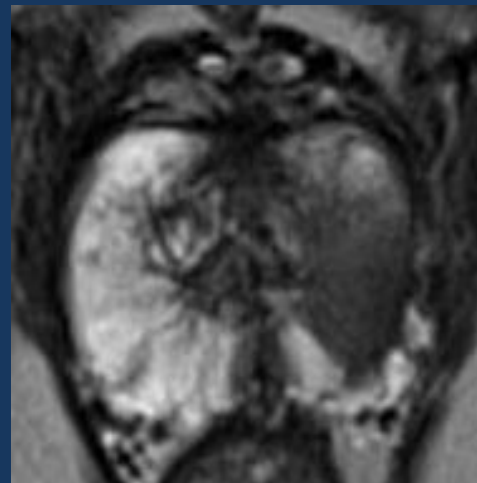
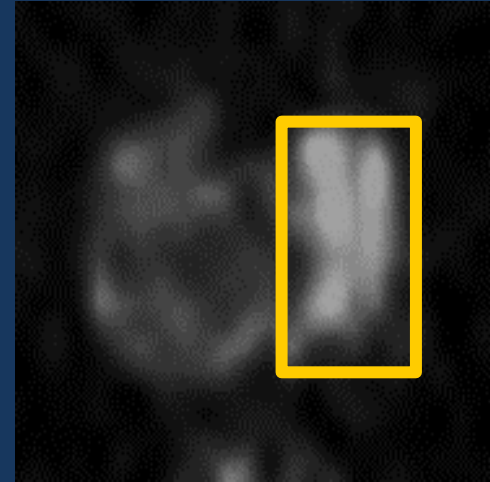
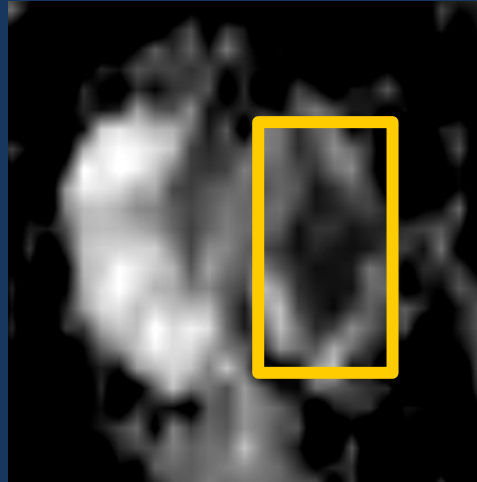
Peripheral Zone (PZ)



Nodule 20 mm

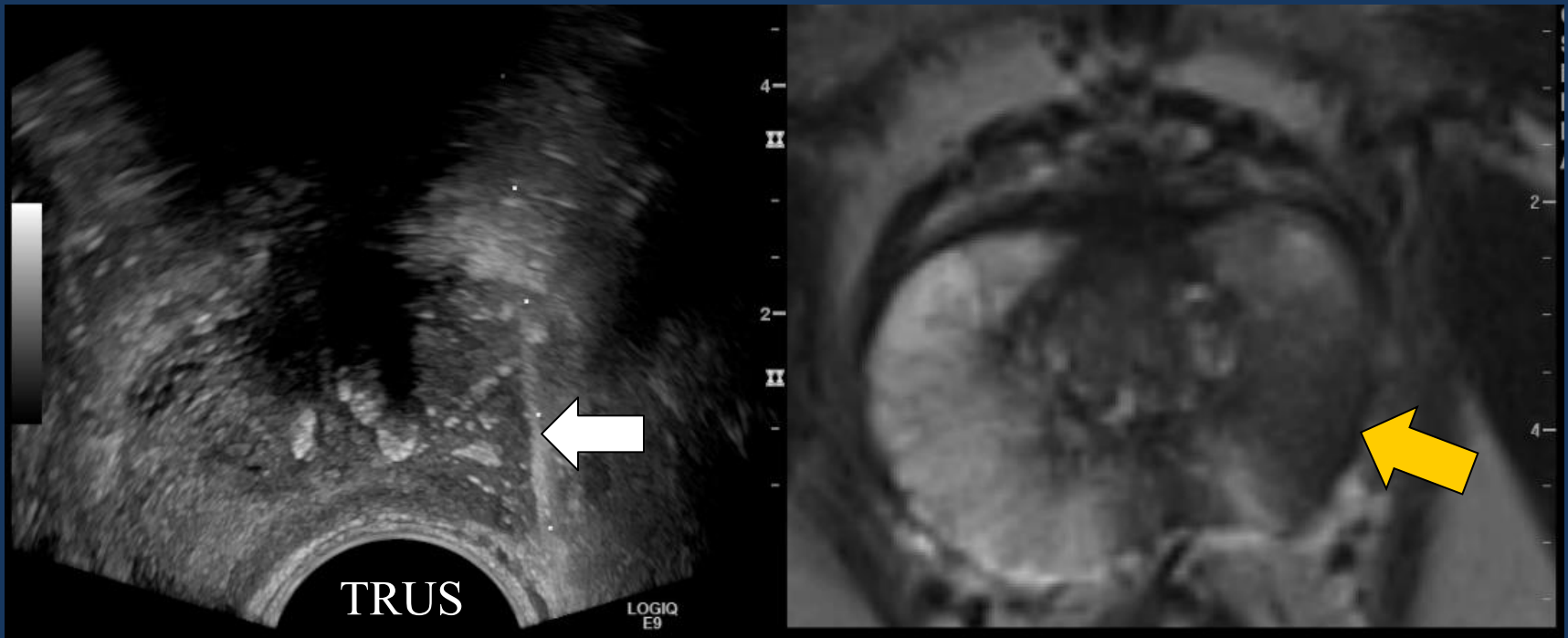


DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



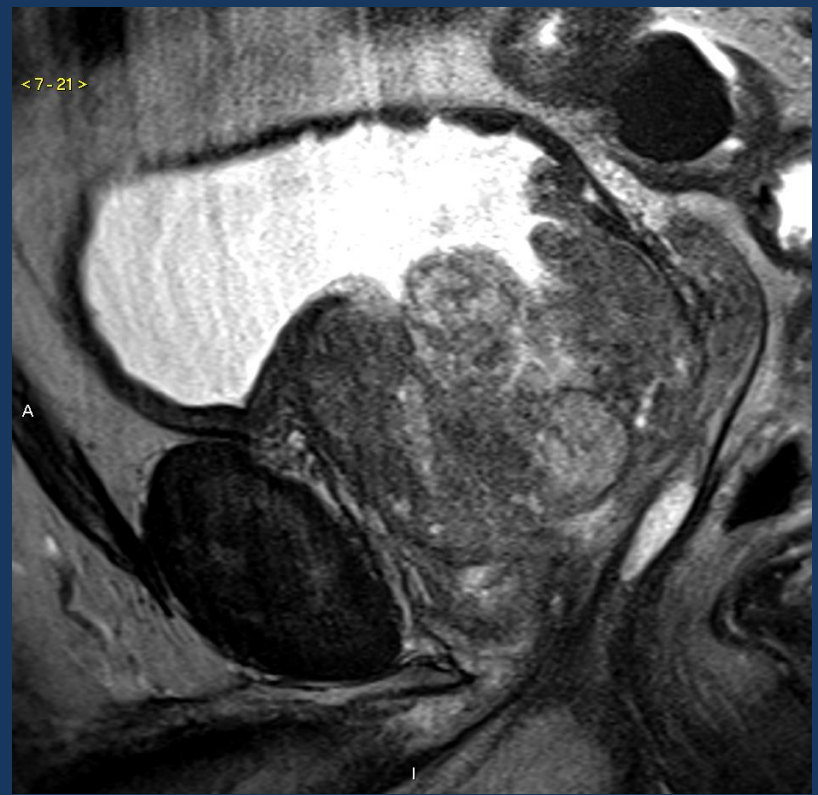
PI-RADS 5: clinically significant cancer highly likely

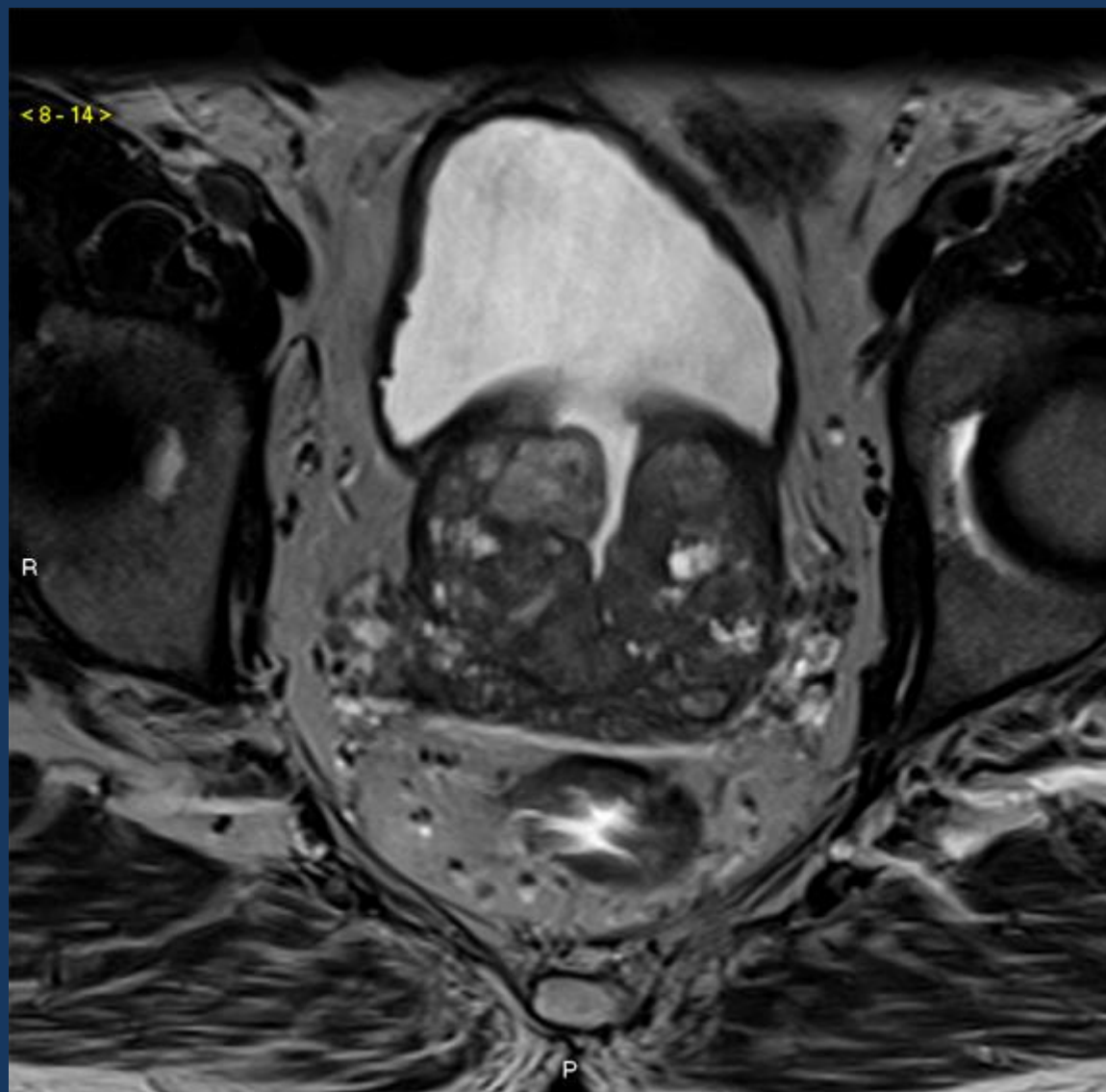
MR-TRUS fusion biopsy

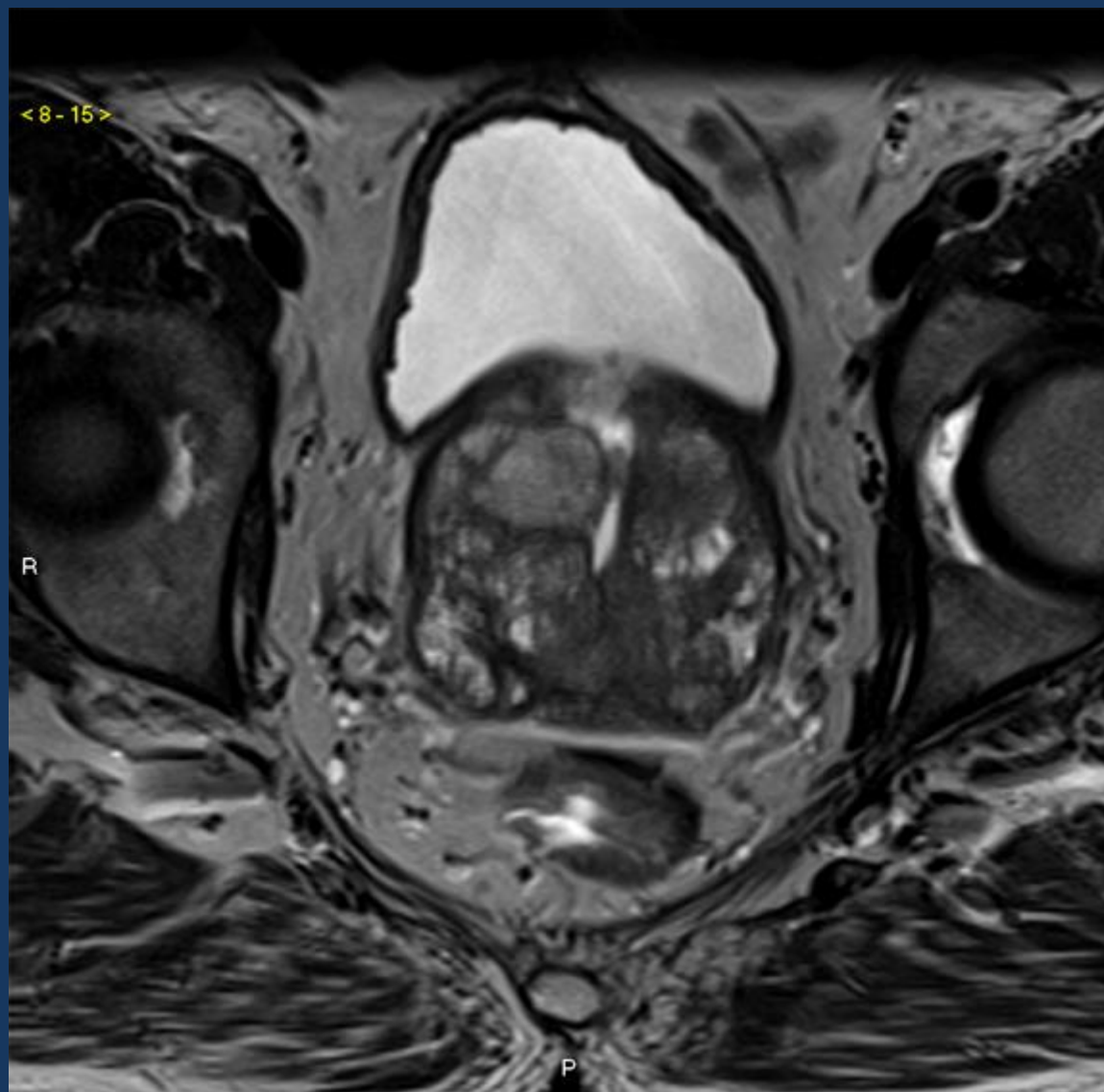


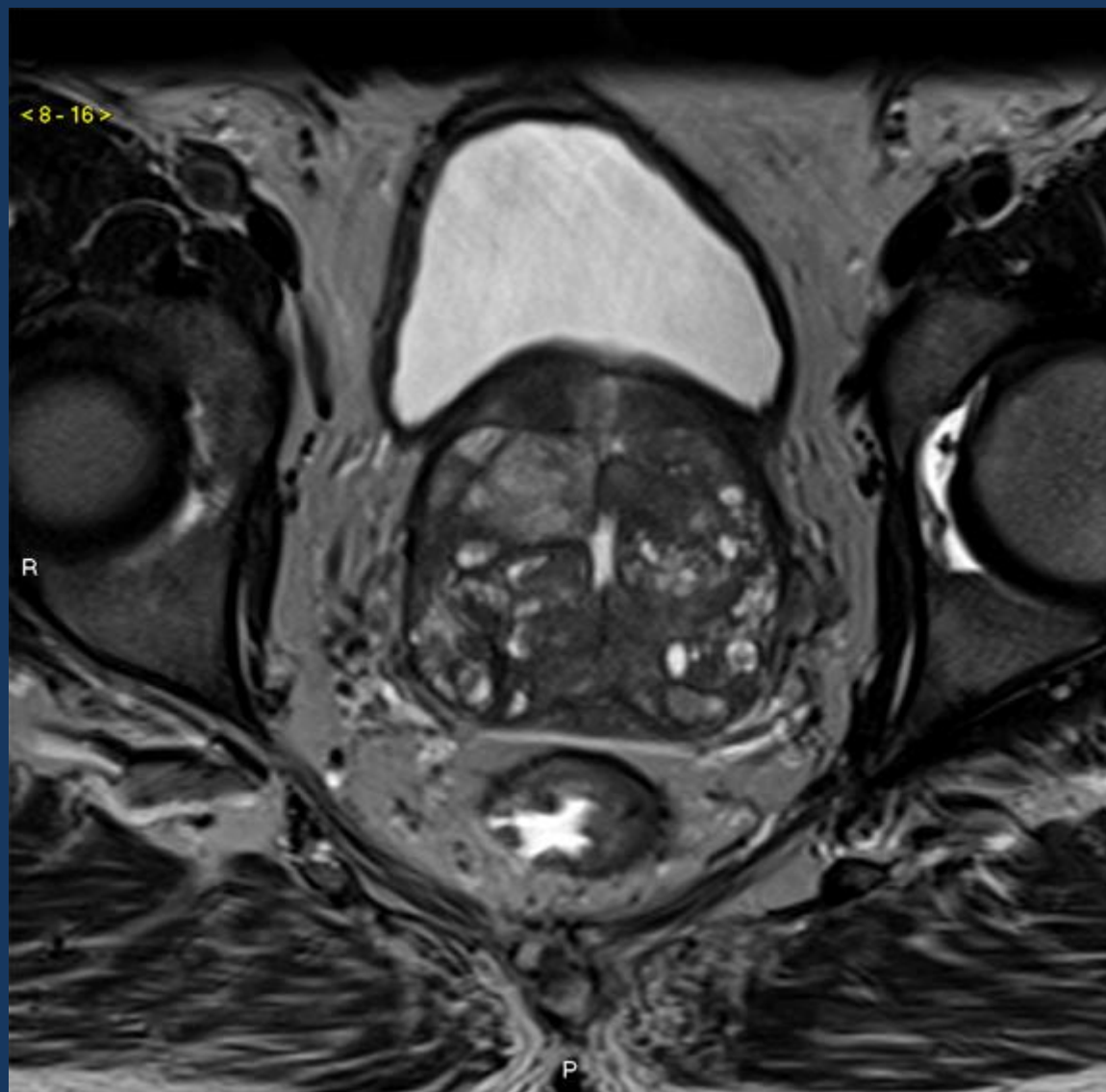
59M, PSA increased from 4.1 to 8.8 ng/mL, no prior BX:
Gleason **3+4=7** (80% of 1 core), G3+3=6 tumor (2 cores, 50% each), and High grade prostatic intra-epithelial neoplasia (HGPIN) → intermediate risk GG2

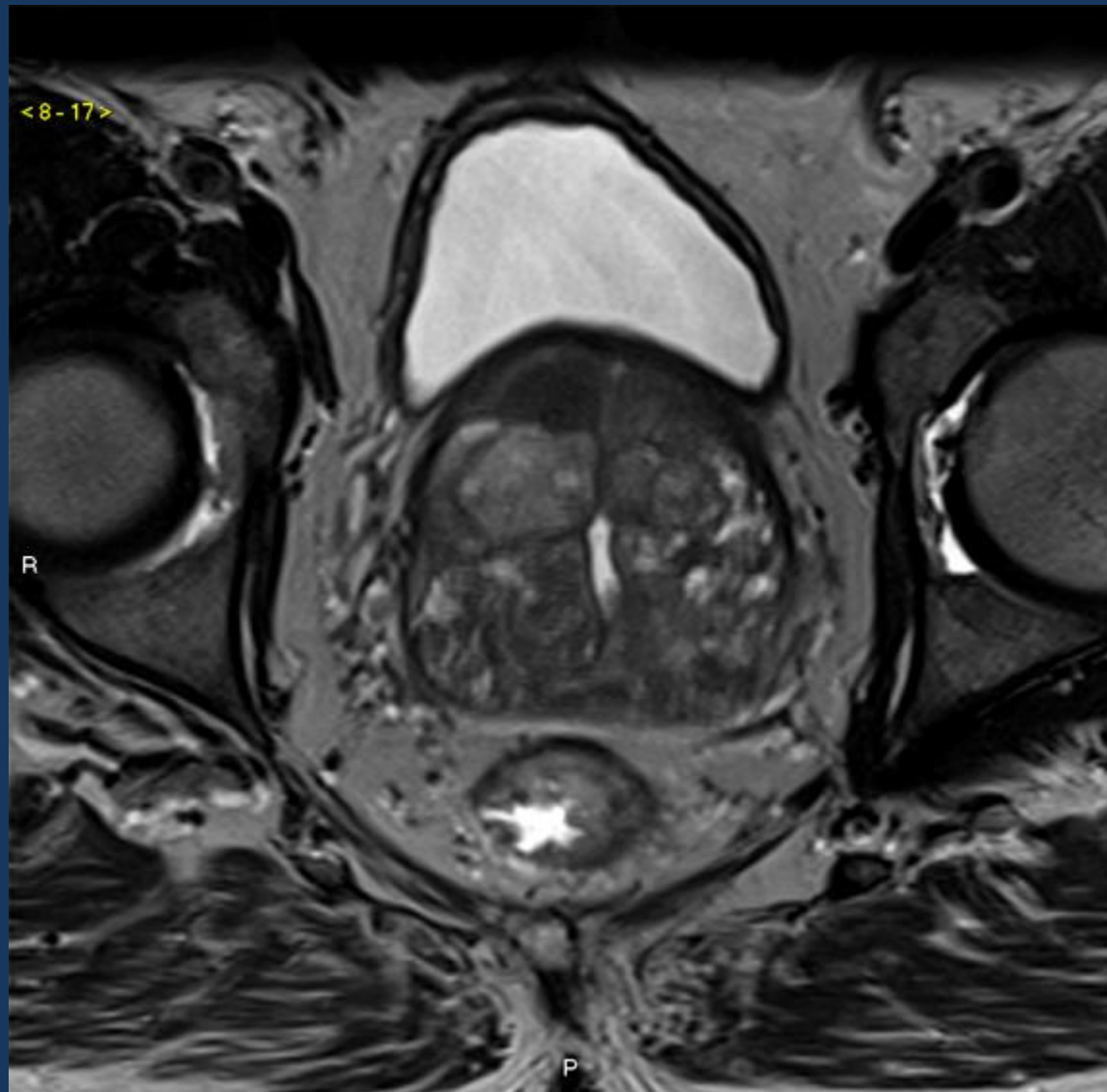
Transition Zone: BPH and ...

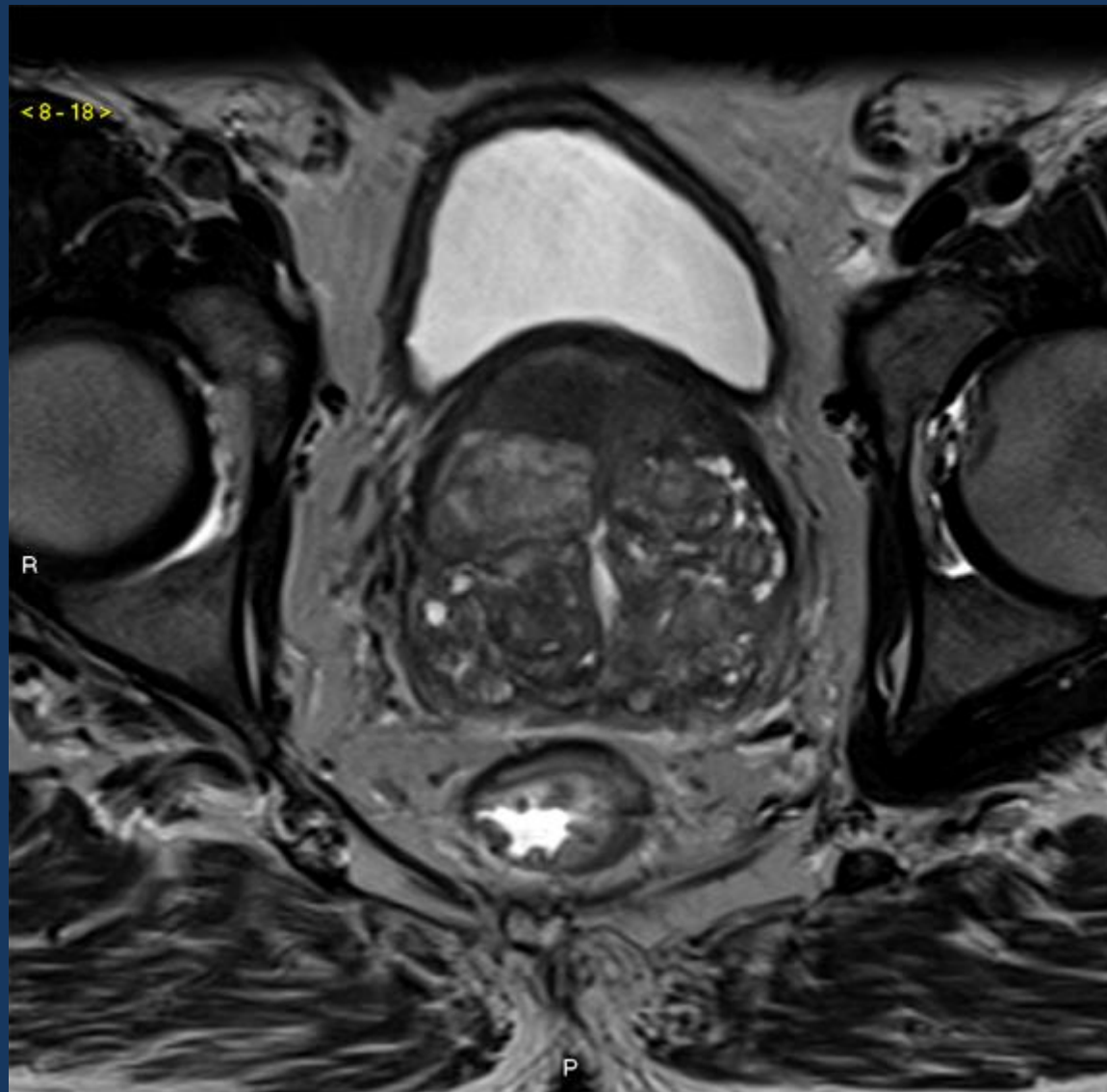


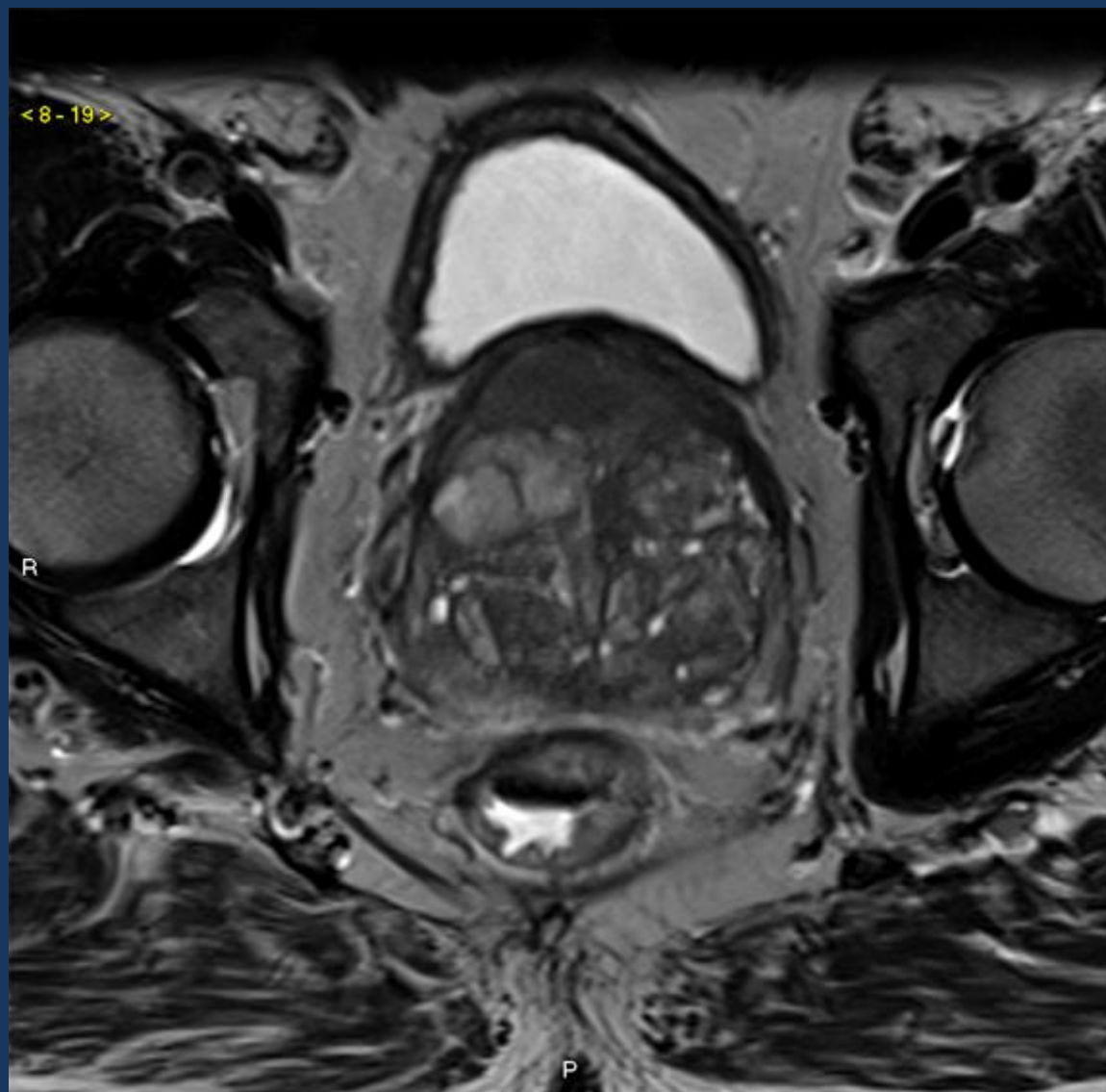


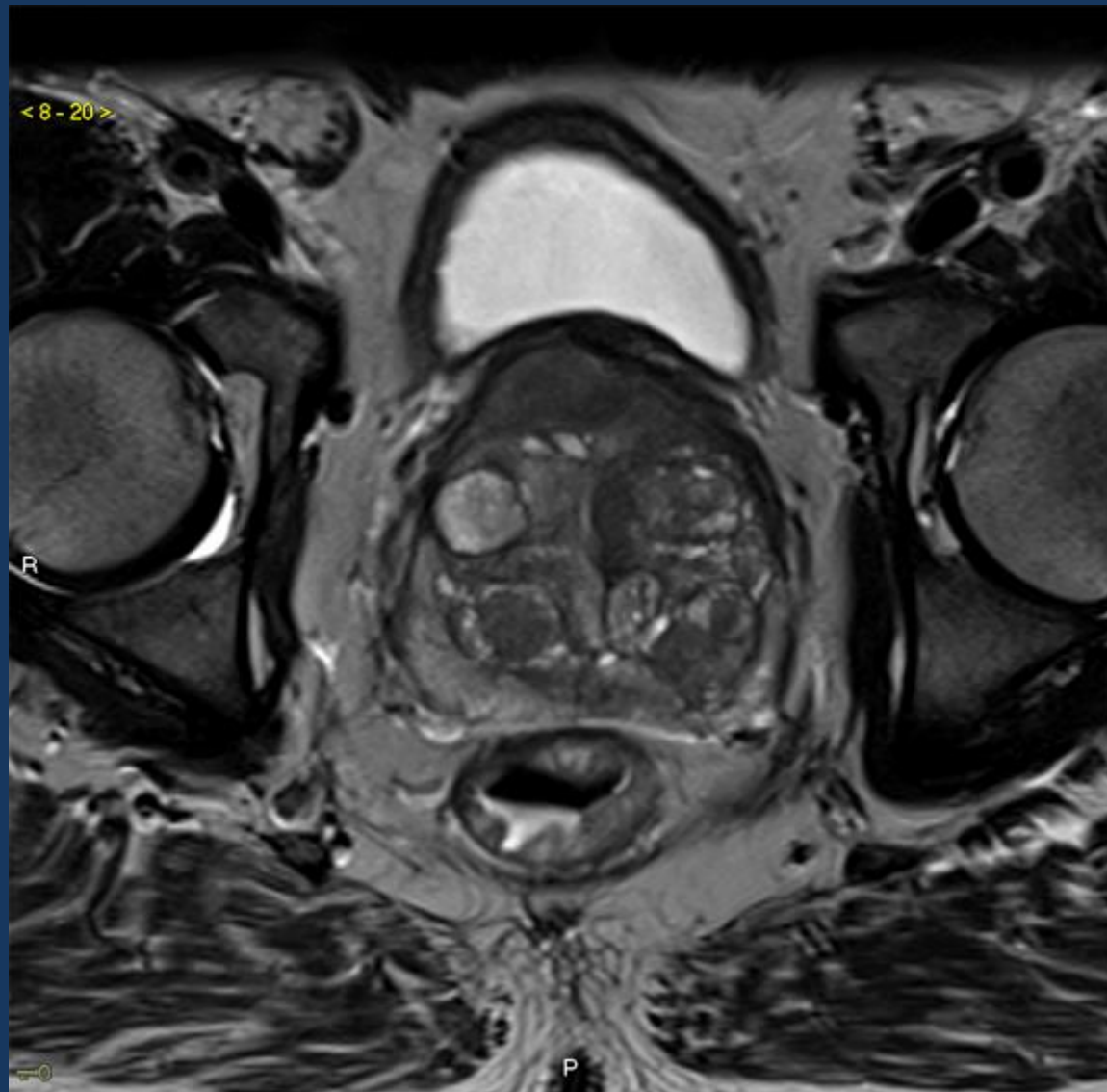


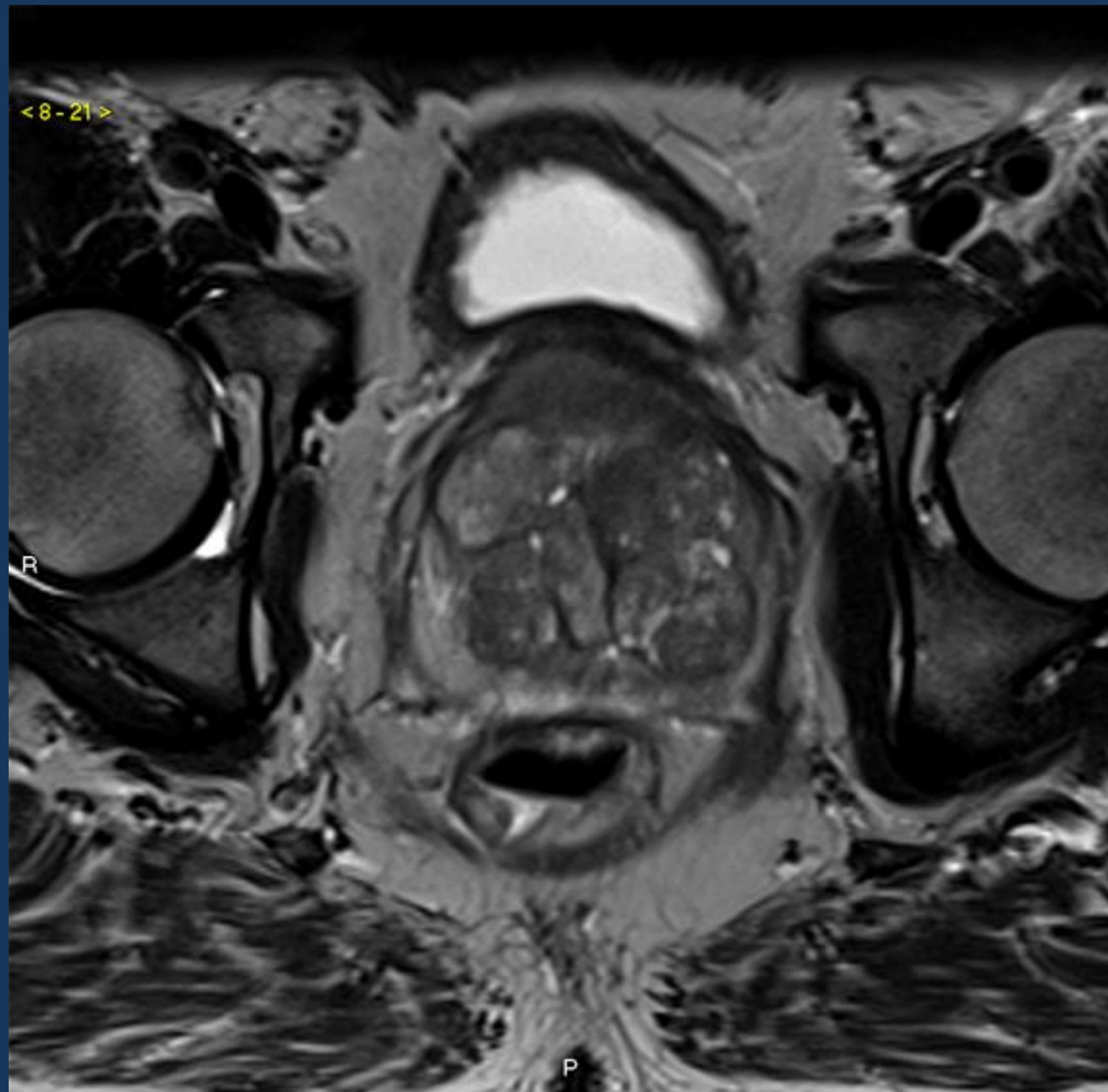


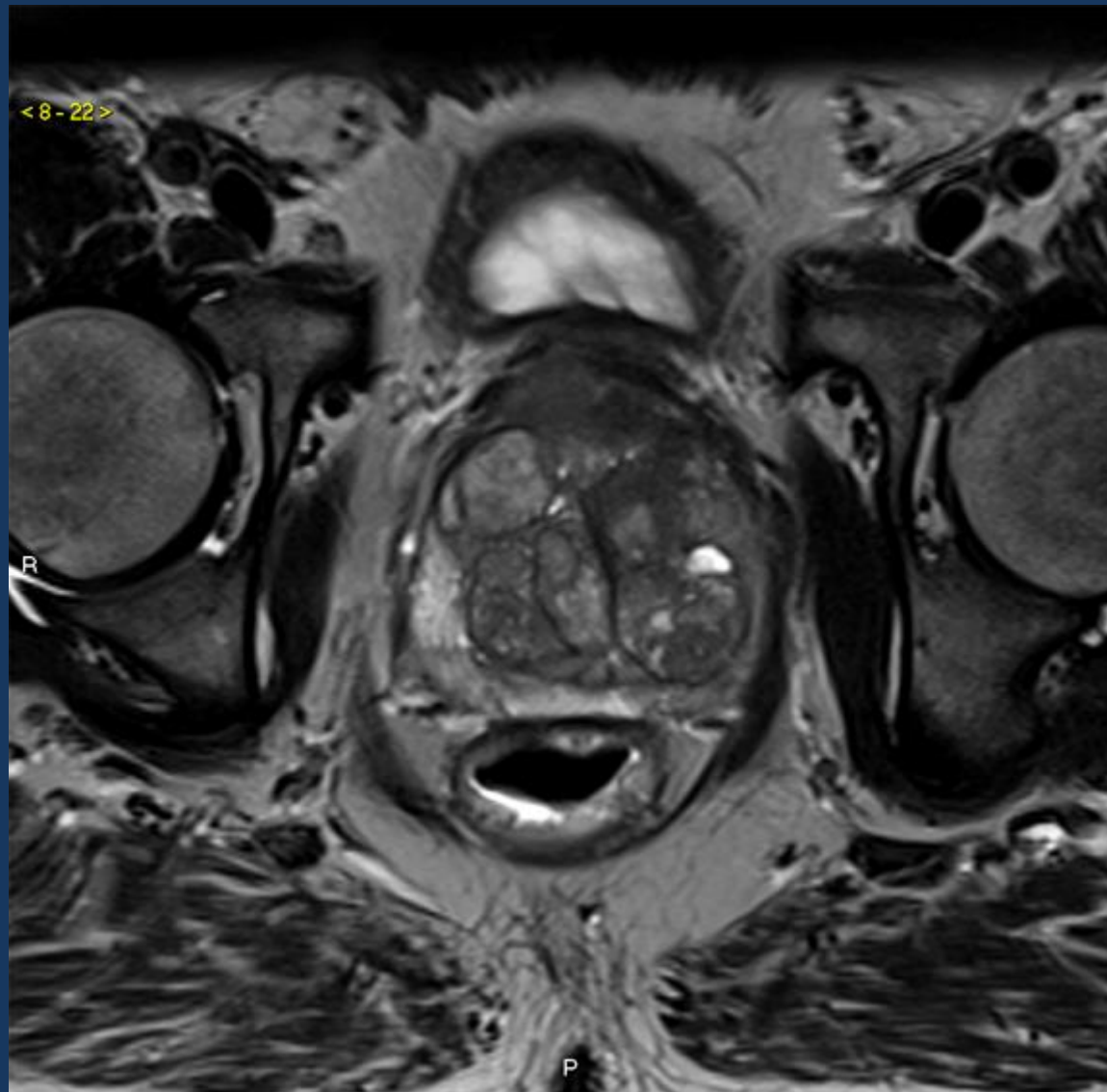


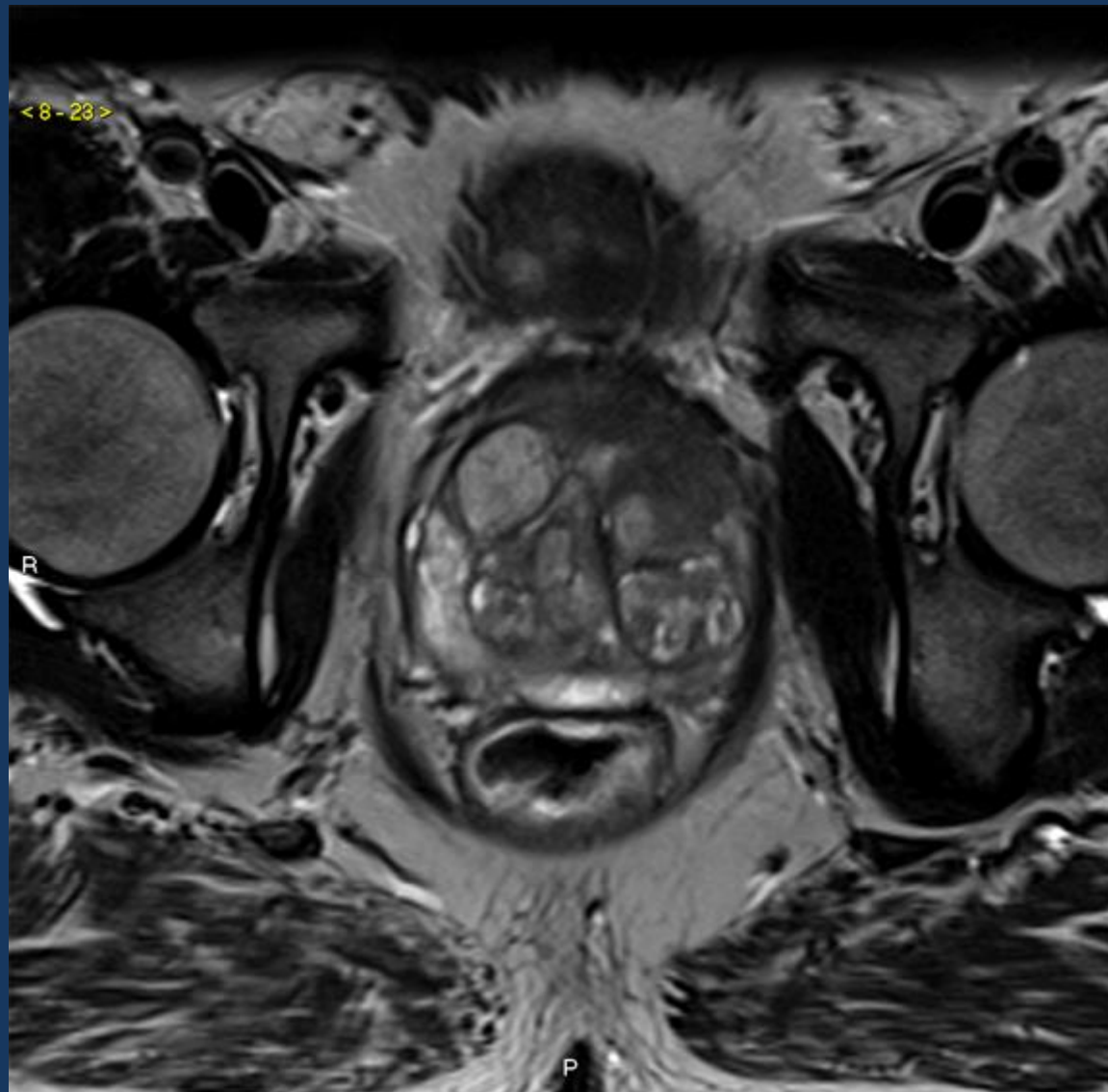


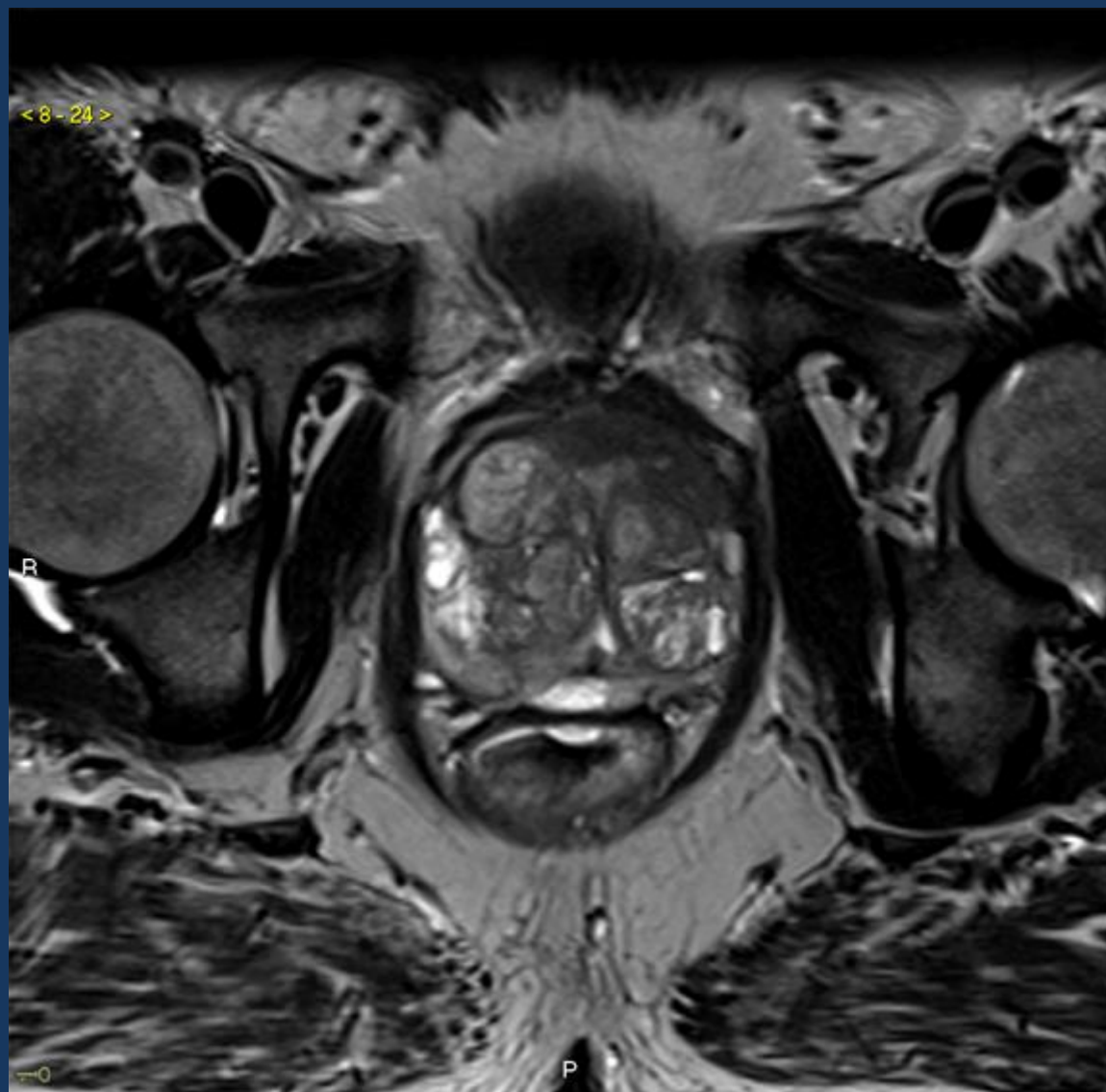






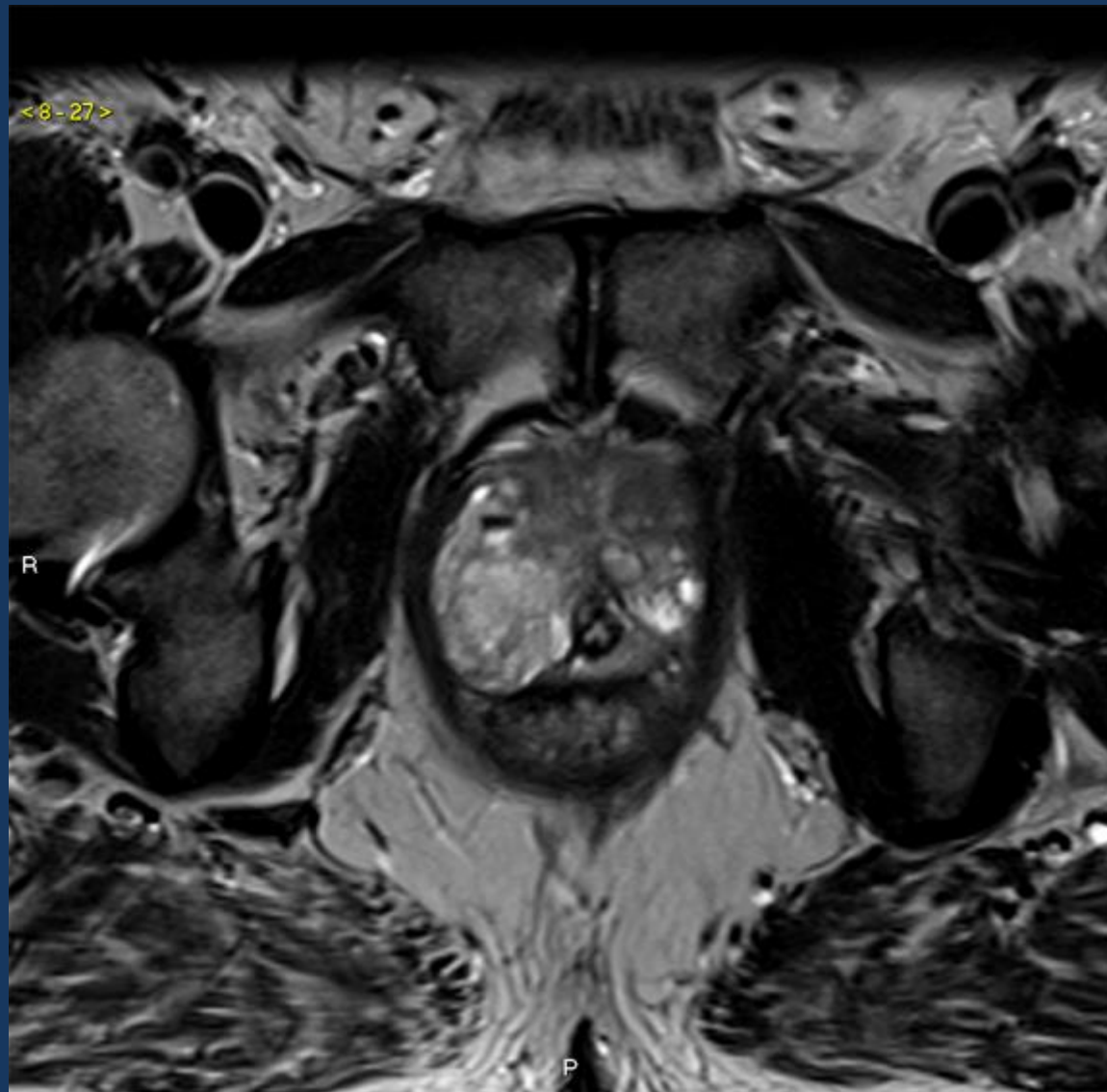


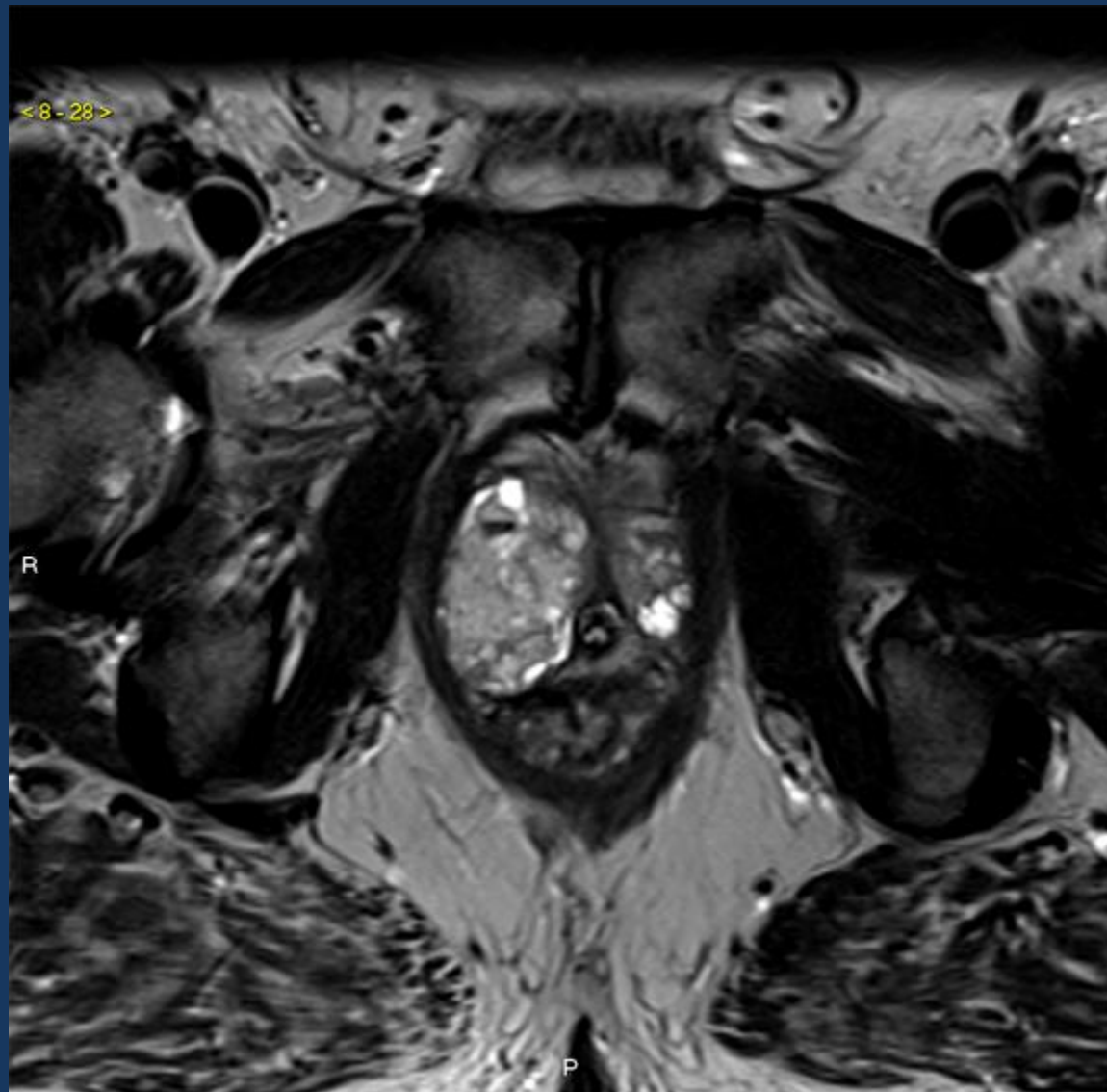


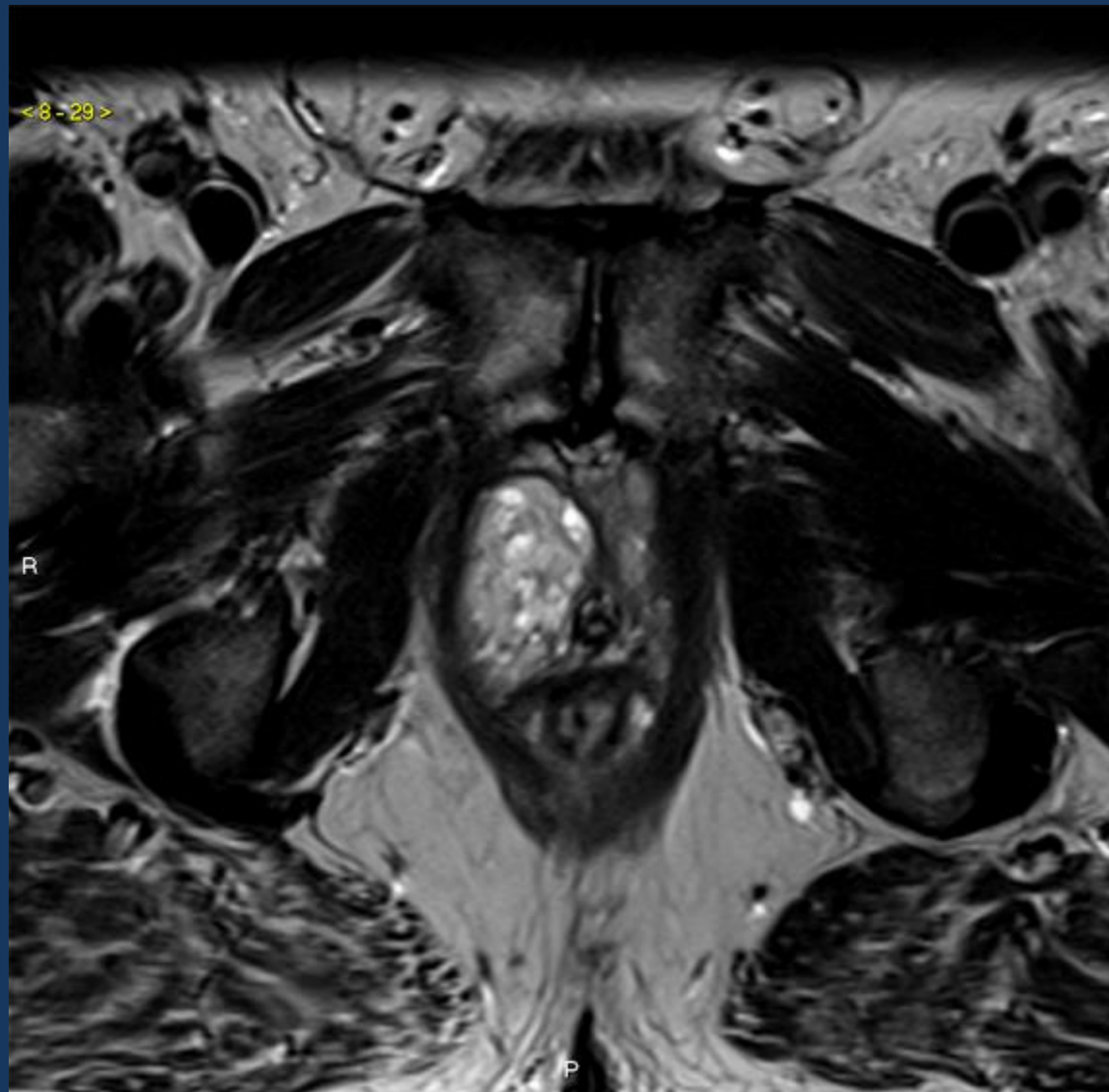


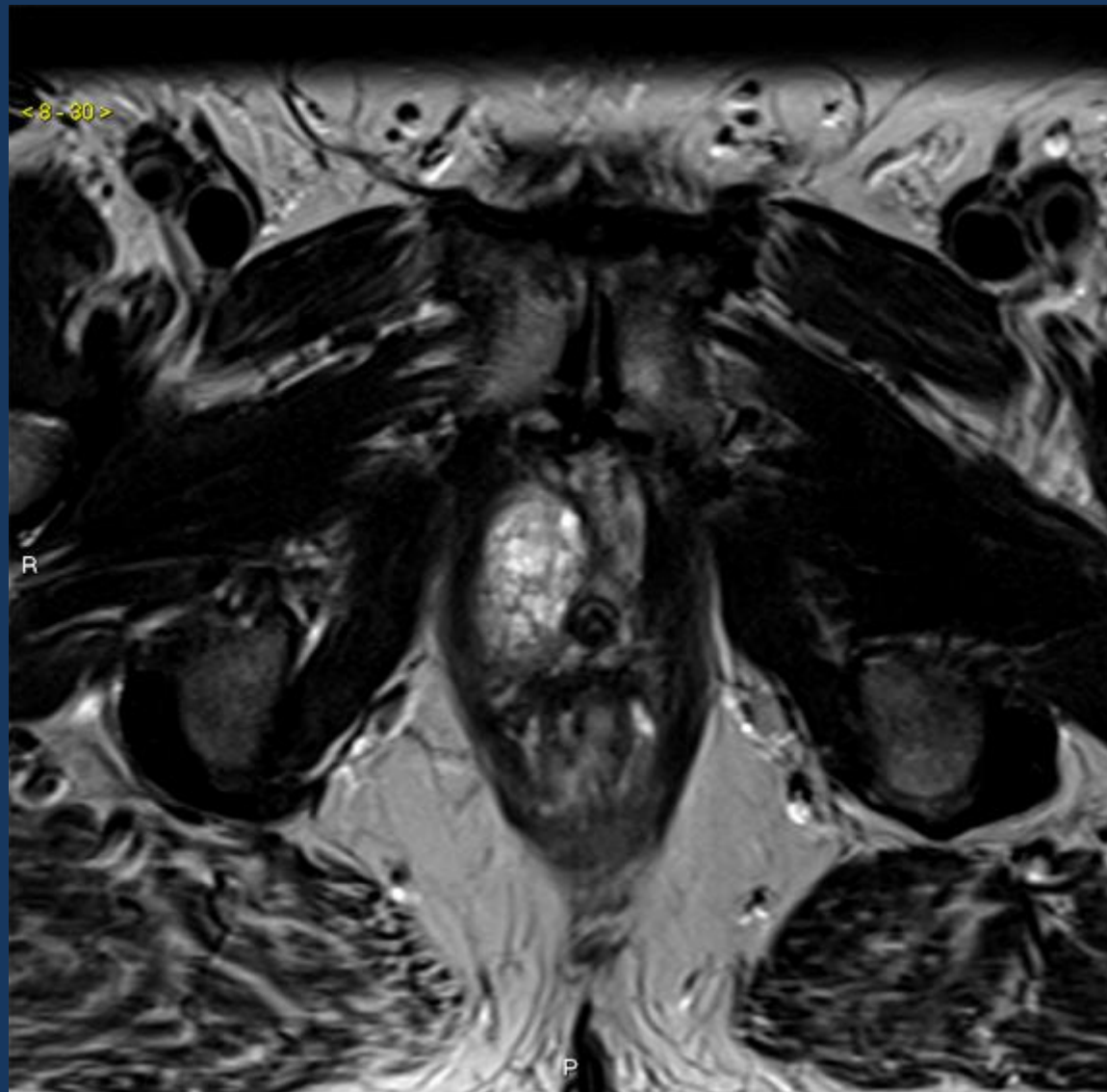


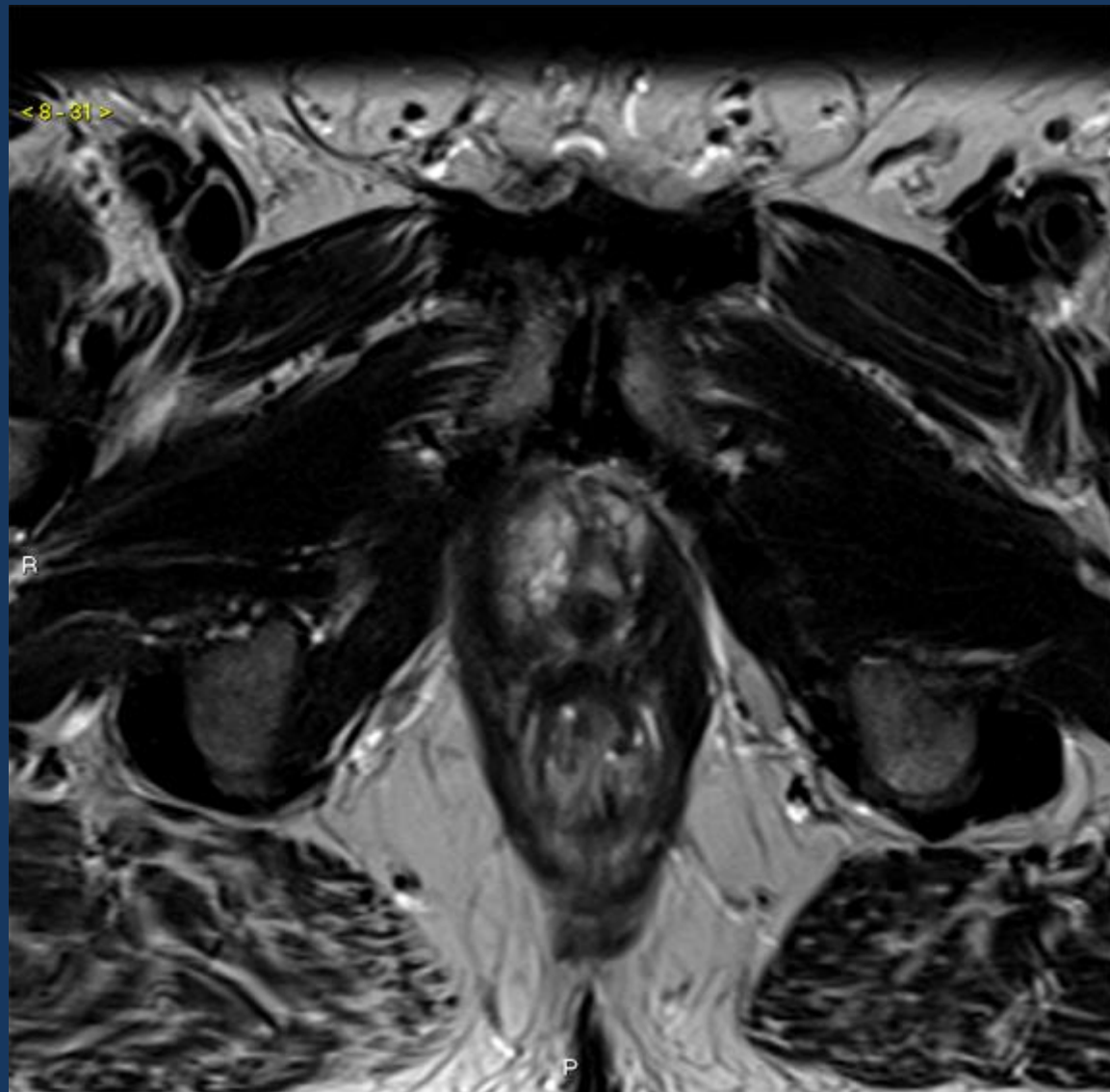




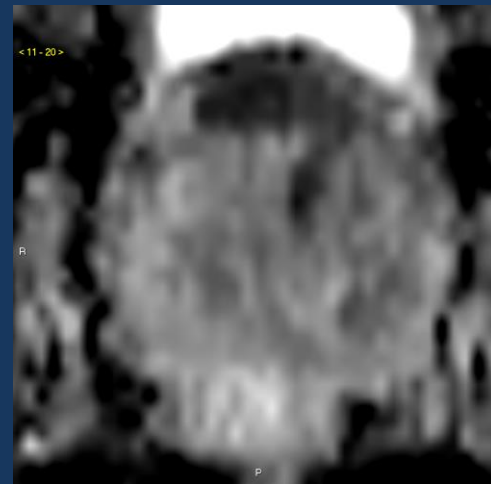
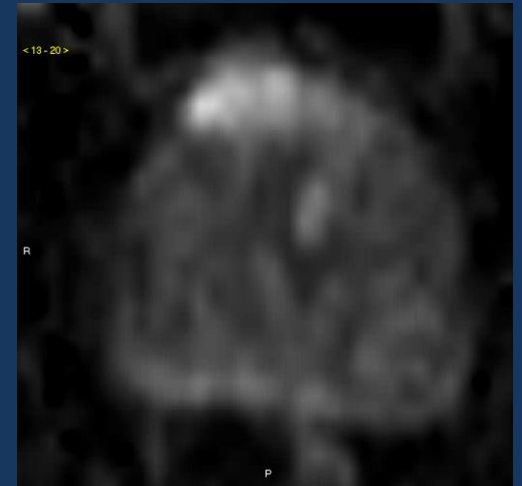
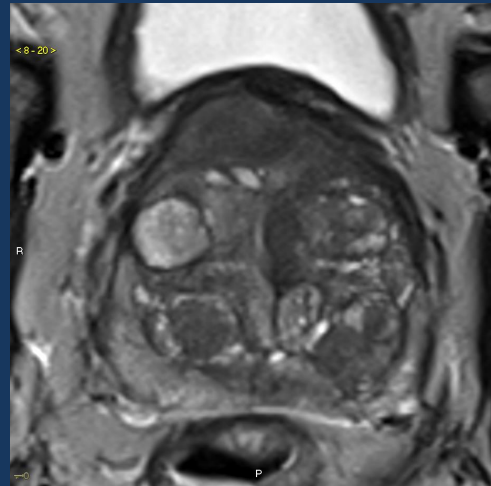








Overall PI-RADS v2.1 Assessment



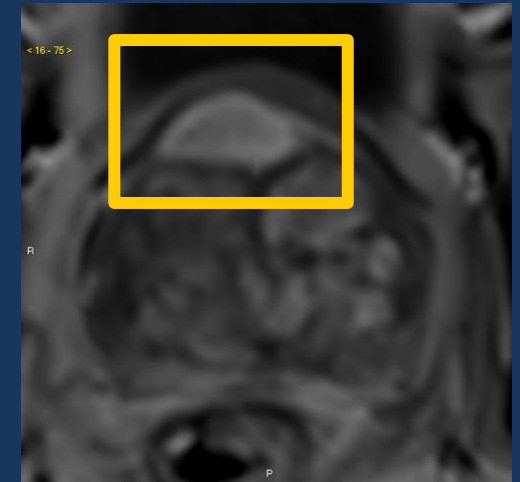
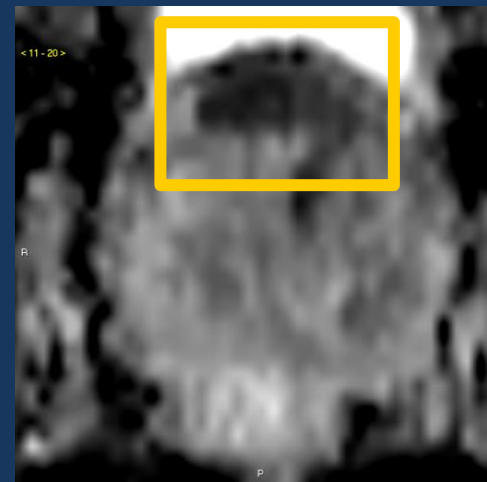
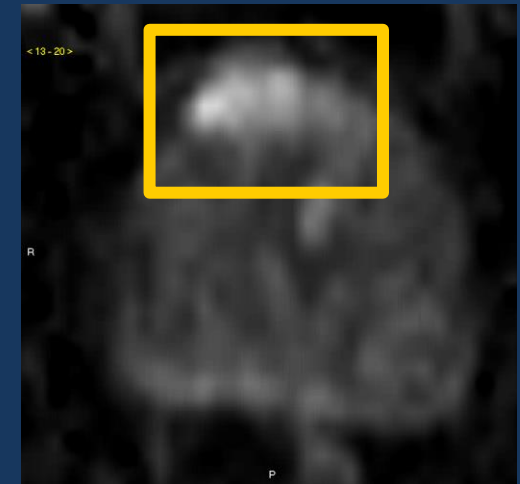
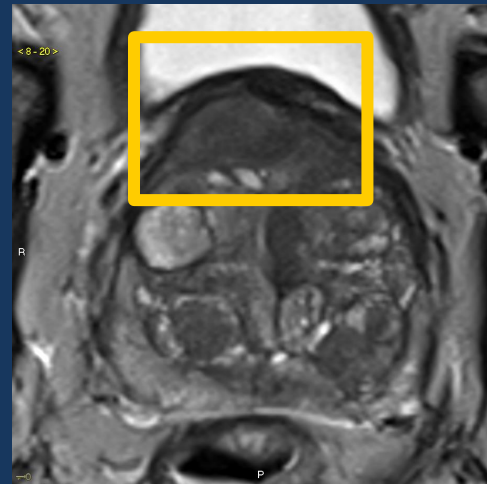
Overall PI-RADS v2.1 Assessment

Transition Zone (TZ)



T2W	DWI	DCE	Overall
1	Any	Any	1
2	≤ 3	Any	2
	≥ 4	Any	3
3	≤ 4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5

Nodule 20 mm



Overall PI-RADS v2.1 Assessment

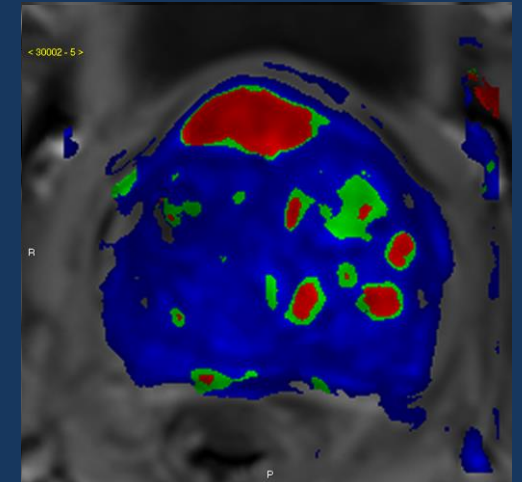
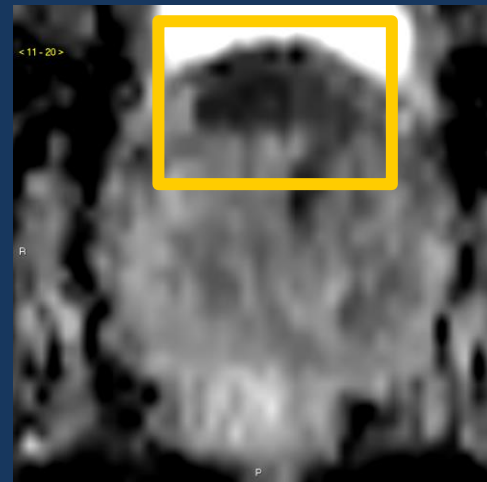
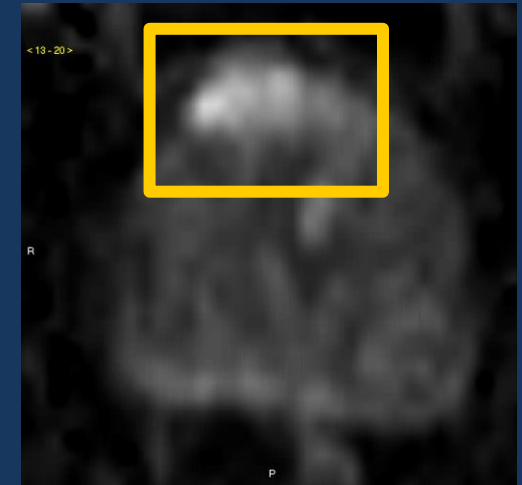
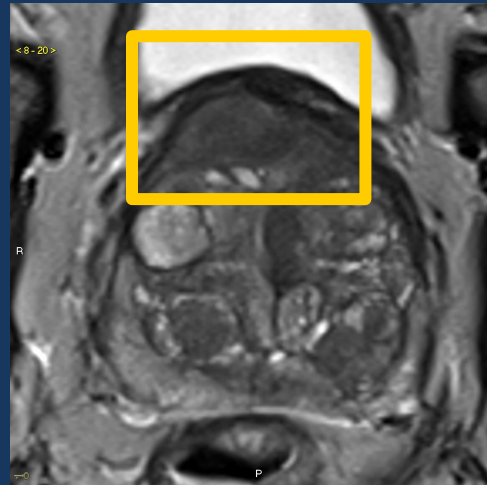
Transition Zone (TZ)



Nodule 20 mm

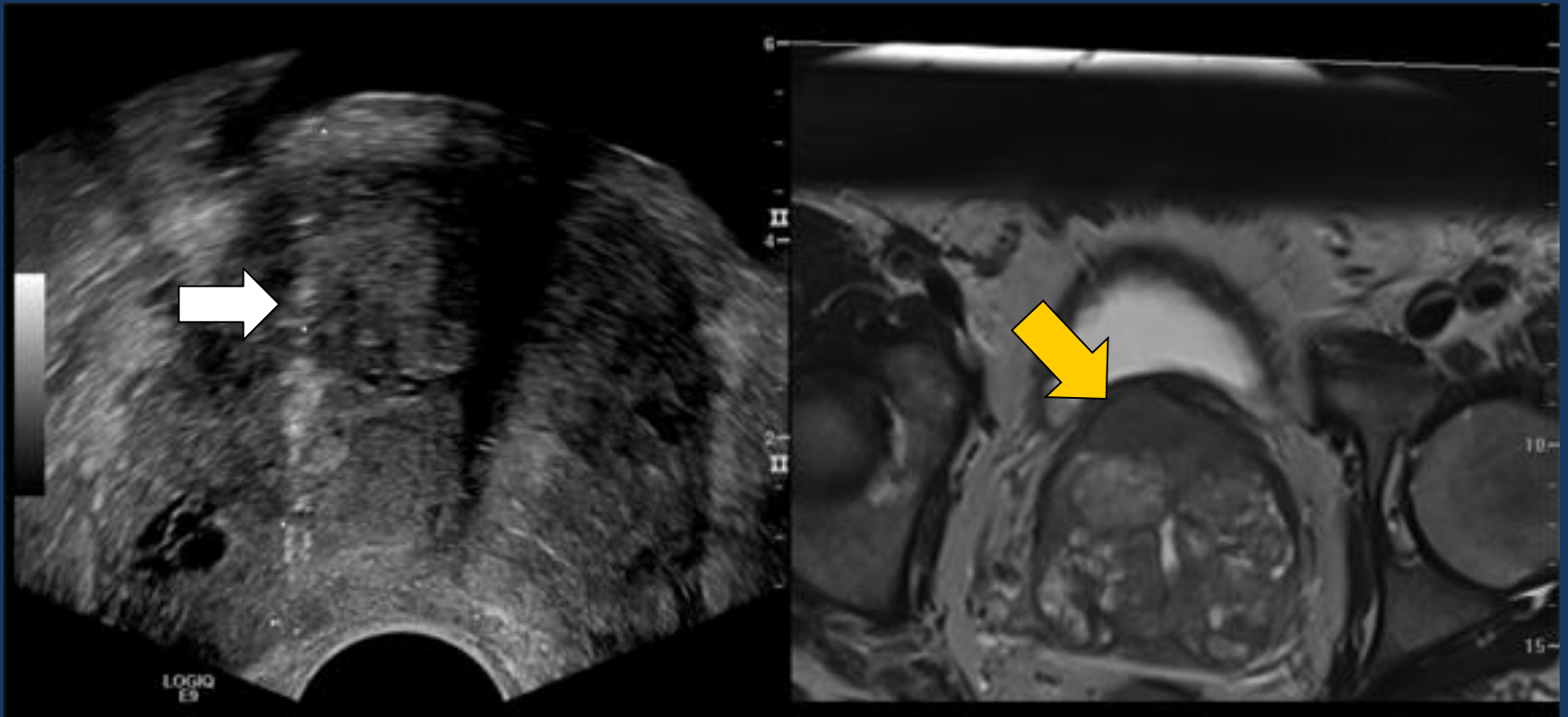


T2W	DWI	DCE	Overall
1	Any	Any	1
2	≤3	Any	2
	≥4	Any	3
3	≤4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5



PI-RADS 5: clinically significant cancer highly likely

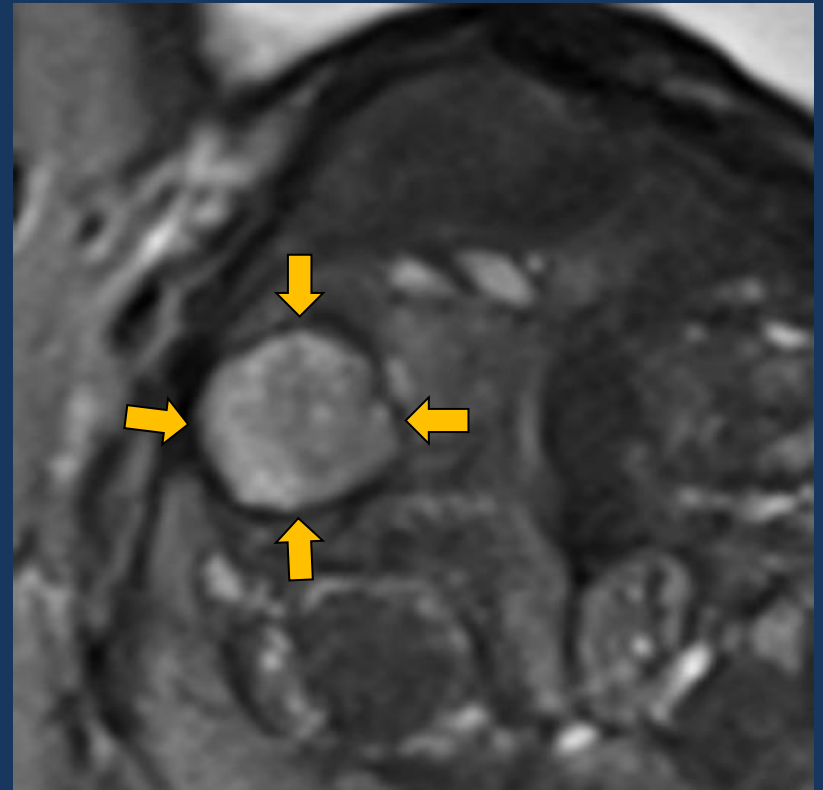
11th prostate biopsy with MR-TRUS guidance



Biopsy: **Gleason 4+3=7** (70%, 100%, 100%), 60% pattern 4
RP: **Gleason 3+5=8**; extraprostatic extension anterior, mid, non-focal
- **high risk GG4**

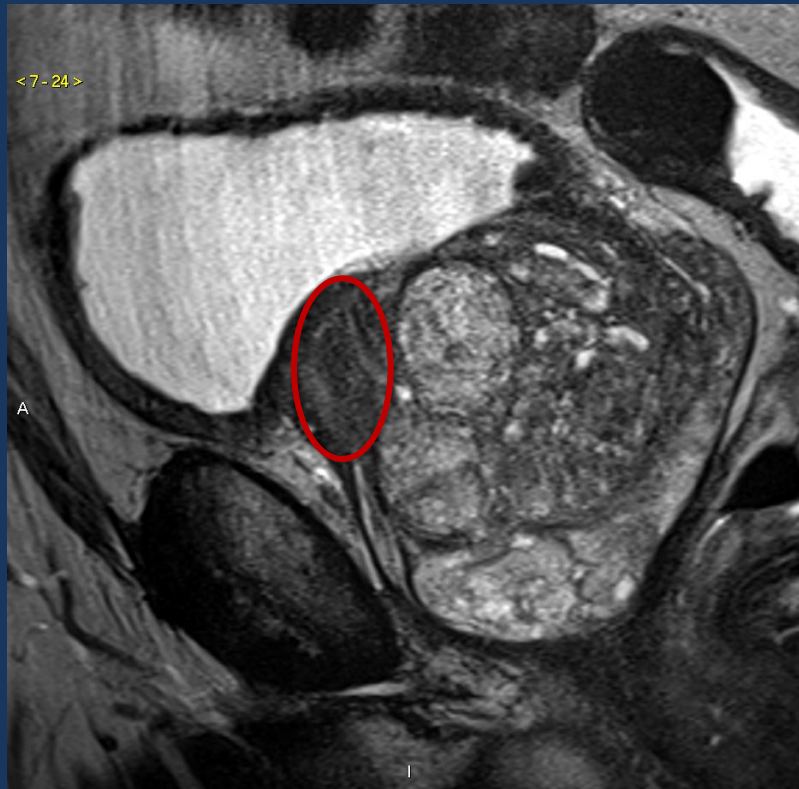
BPH nodule vs. TZ Cancer

- **Encapsulated**
- **Heterogeneous**

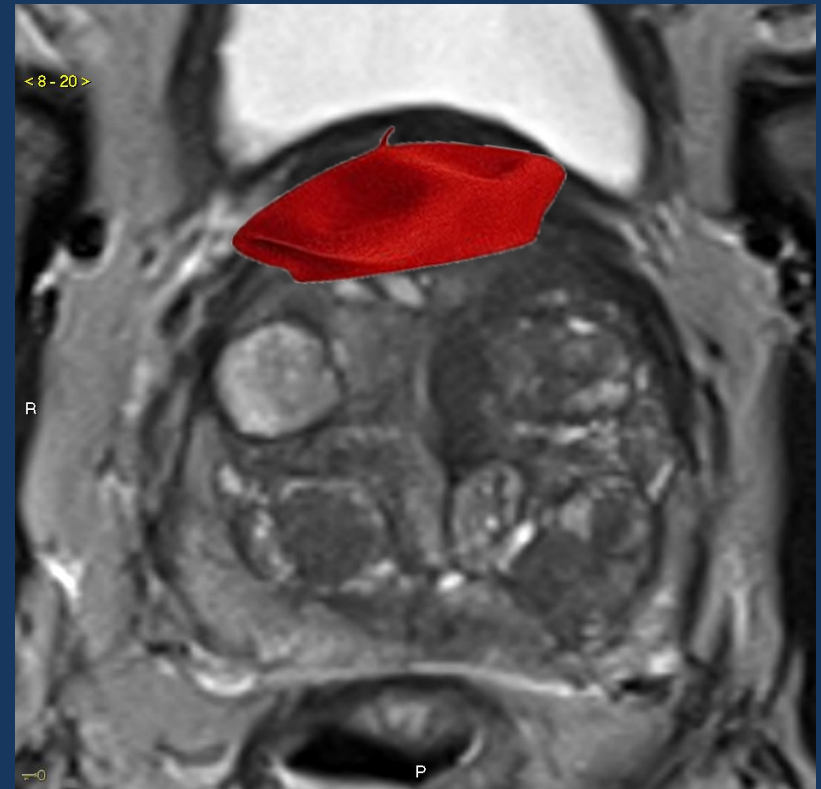


BPH nodule vs. TZ Cancer

- **Encapsulated**
- **Heterogeneous**



- **Lenticular, irregular**
- **Homogeneous low T2**



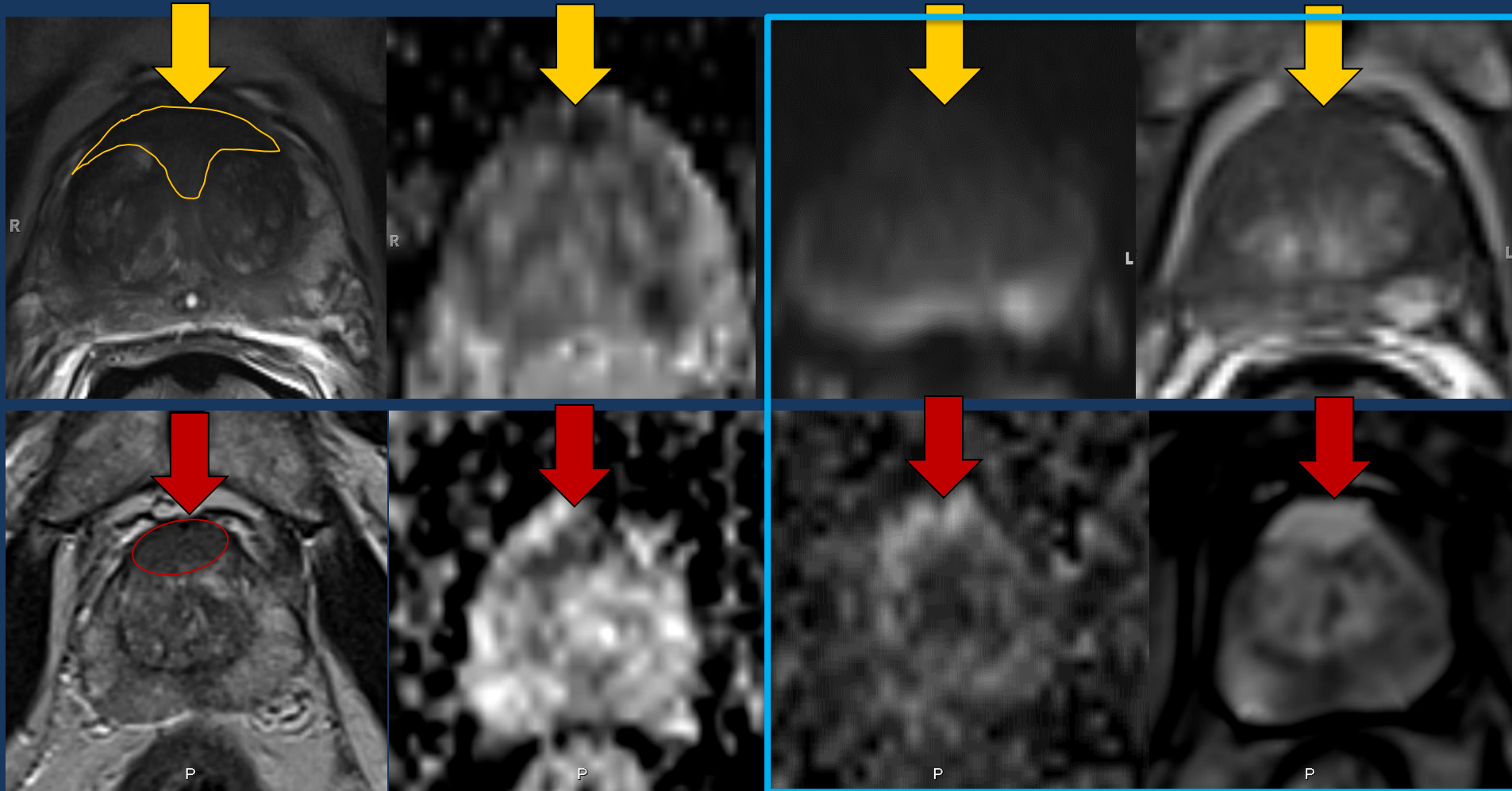
Anterior fibromuscular stroma vs. Cancer

T2WI

ADC

DWI

DCE



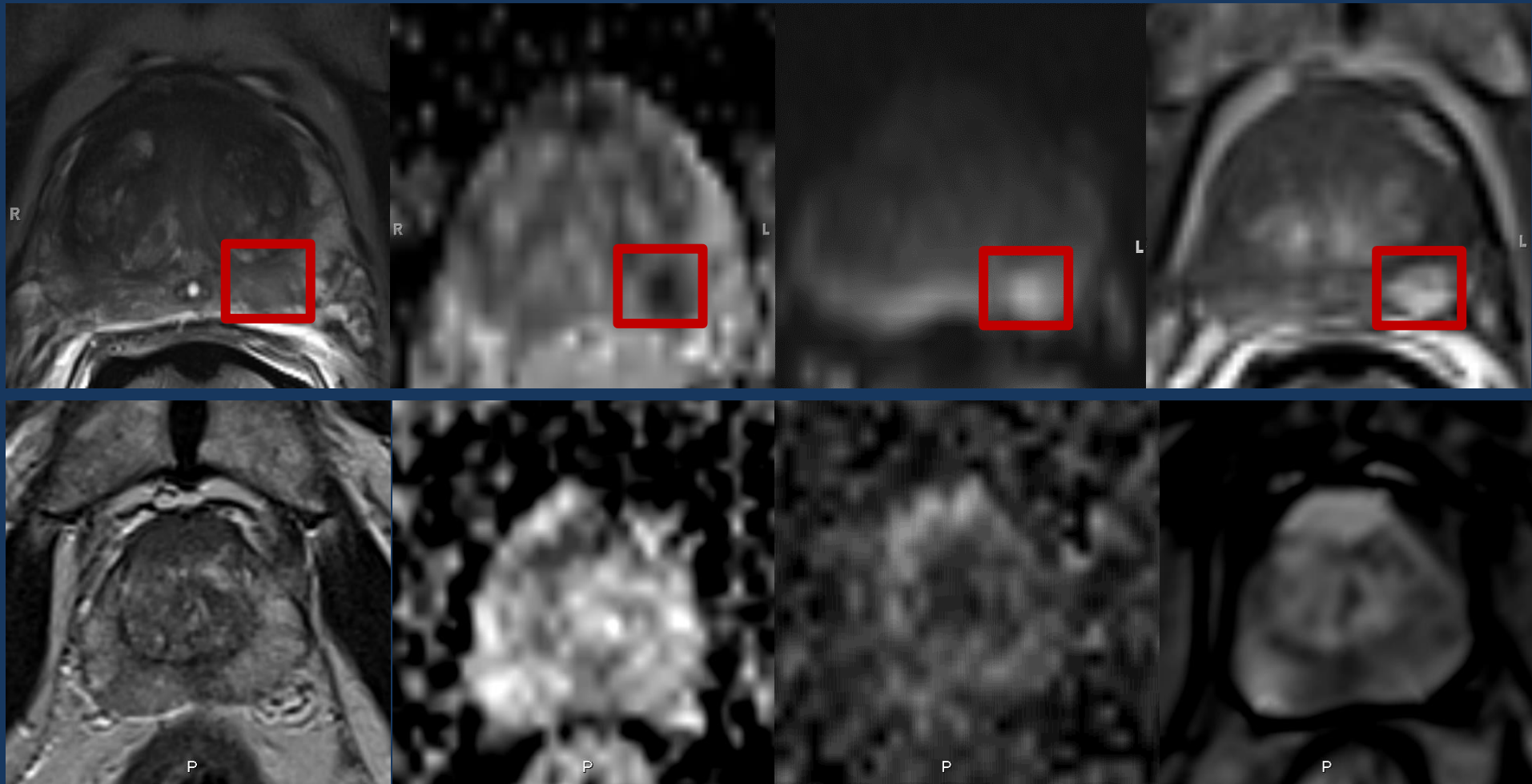
Anterior fibromuscular stroma vs. Cancer

T2WI

ADC

DWI

DCE





PZ and TZ Cancer

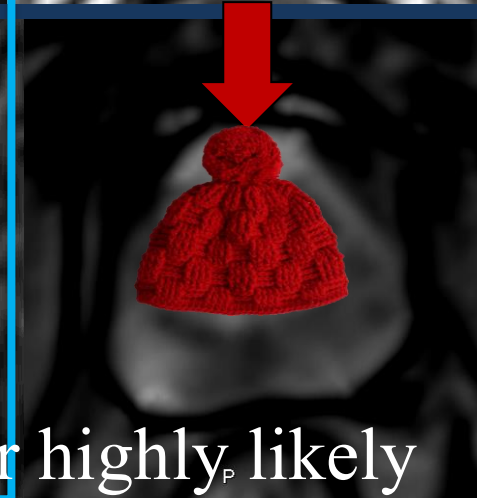
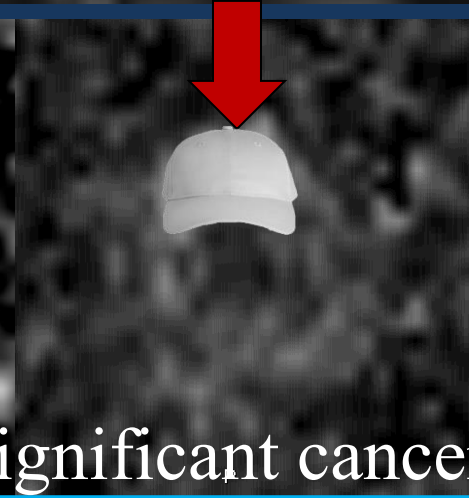
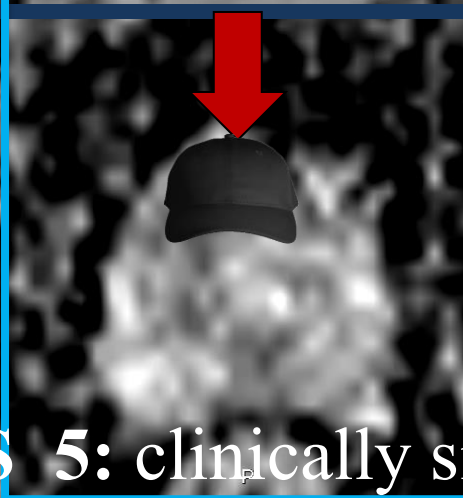
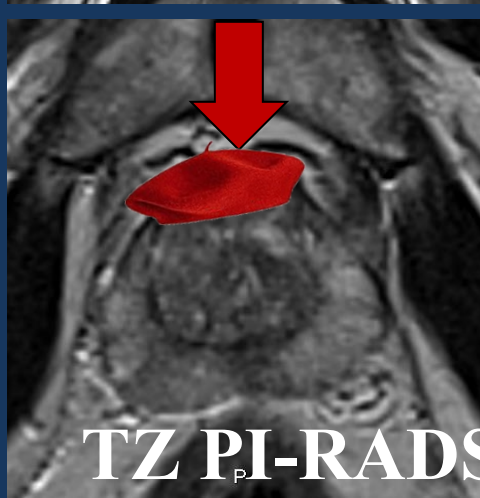
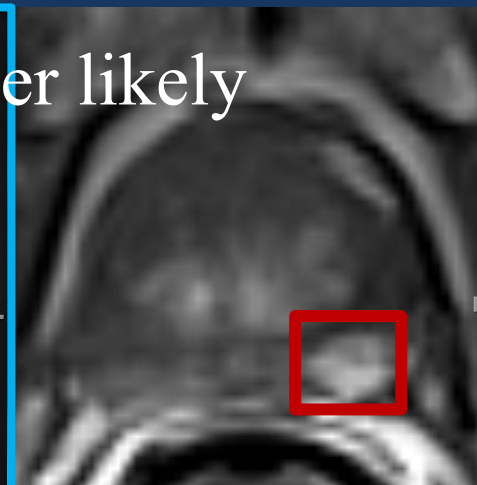
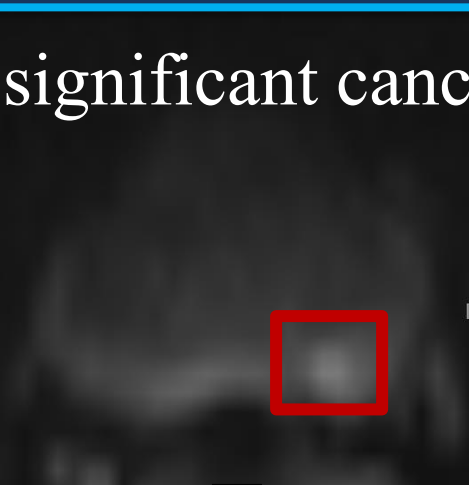
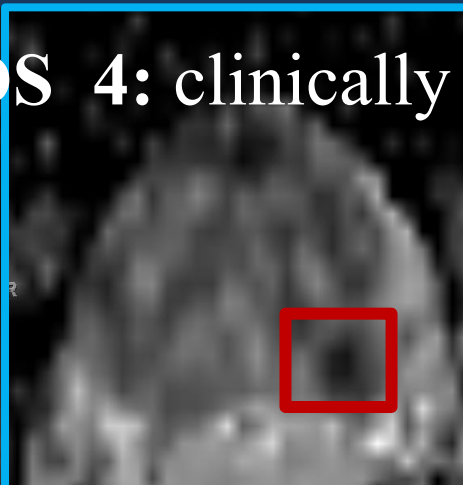
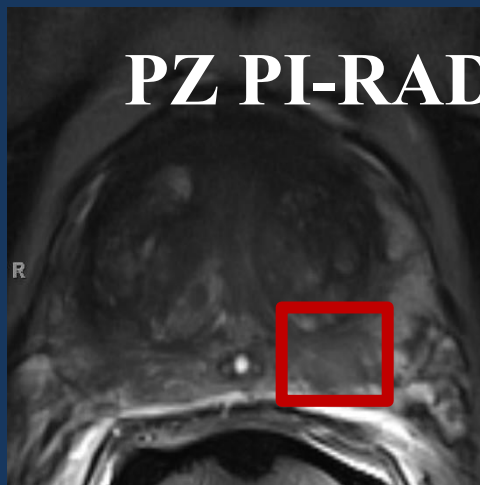
T2WI

ADC

DWI

DCE

PZ PI-RADS 4: clinically significant cancer likely

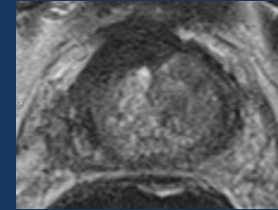


TZ PI-RADS 5: clinically significant cancer highly likely

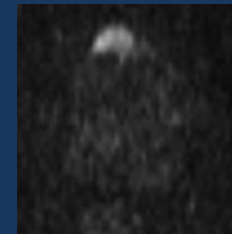
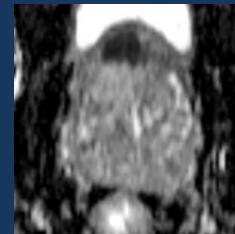
Transition Zone Signs = TZ Made Easy!

■ Malignant “Hat”:

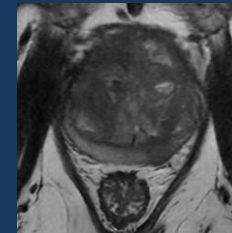
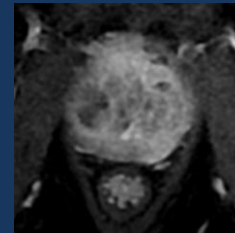
- T2WI French Beret



- DWI Black&White Hat



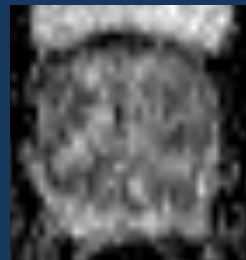
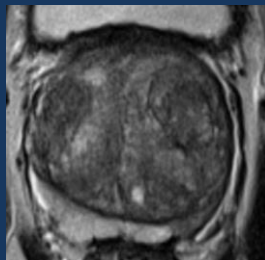
- DCE PomPom Hat



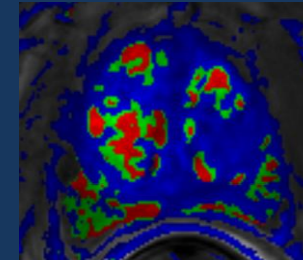
TZa Target:
3+4=7 (GG 2)

■ Benign:

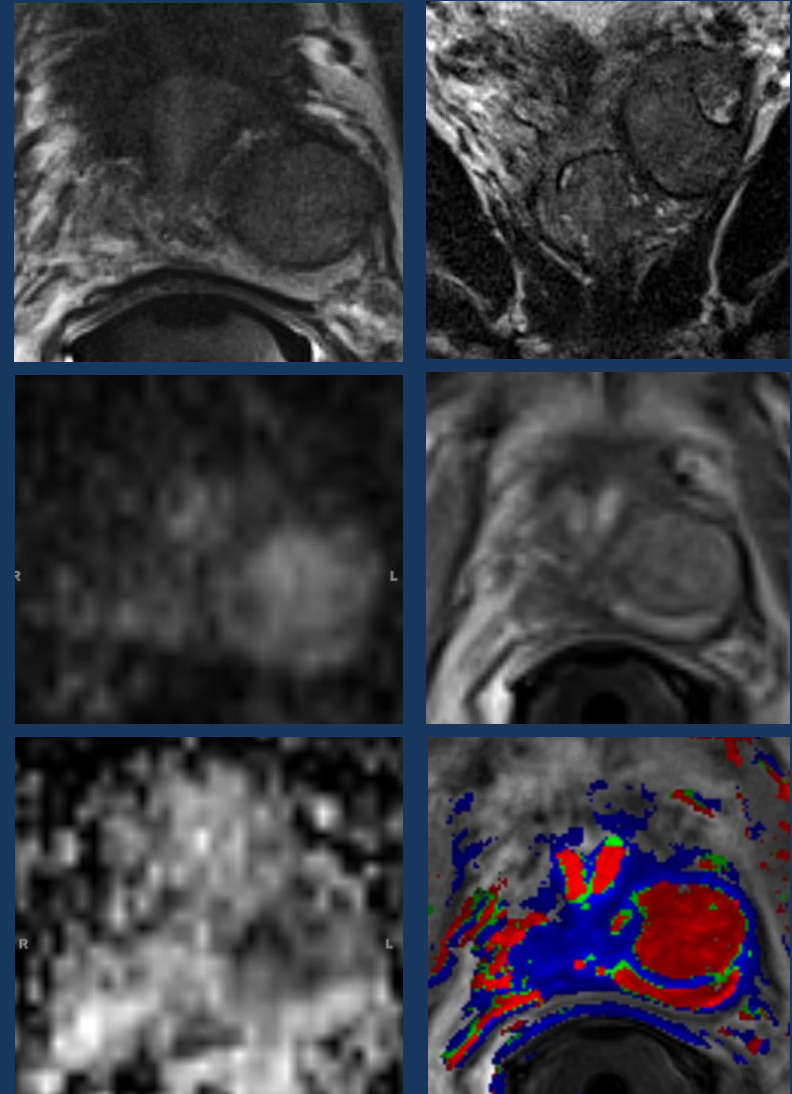
- T2WI and DWI Copy&Paste



DCE Popcorn



Overall PI-RADS v2.1 Assessment

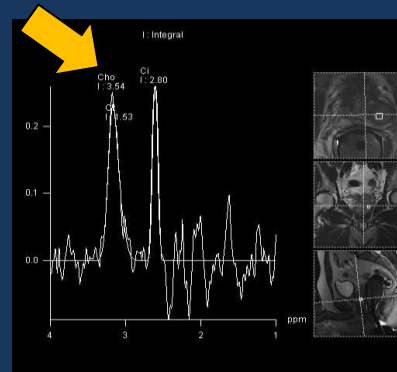


Overall PI-RADS v2.1 Assessment

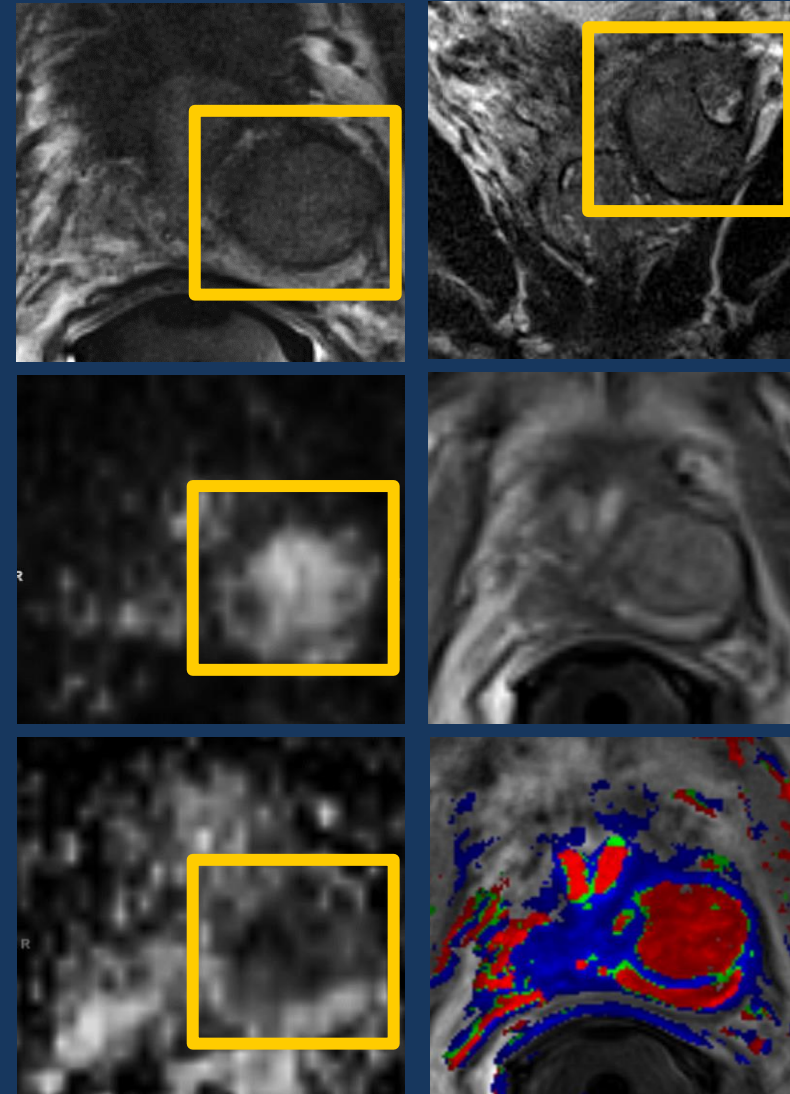
Transition Zone (TZ)



T2W	DWI	DCE	Overall
1	Any	Any	1
2	≤ 3	Any	2
	≥ 4	Any	3
3	≤ 4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5



Nodule 25 mm

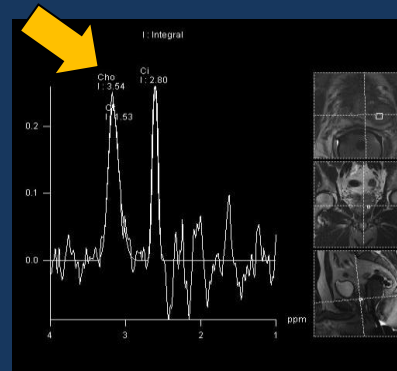


Overall PI-RADS v2.1 Assessment

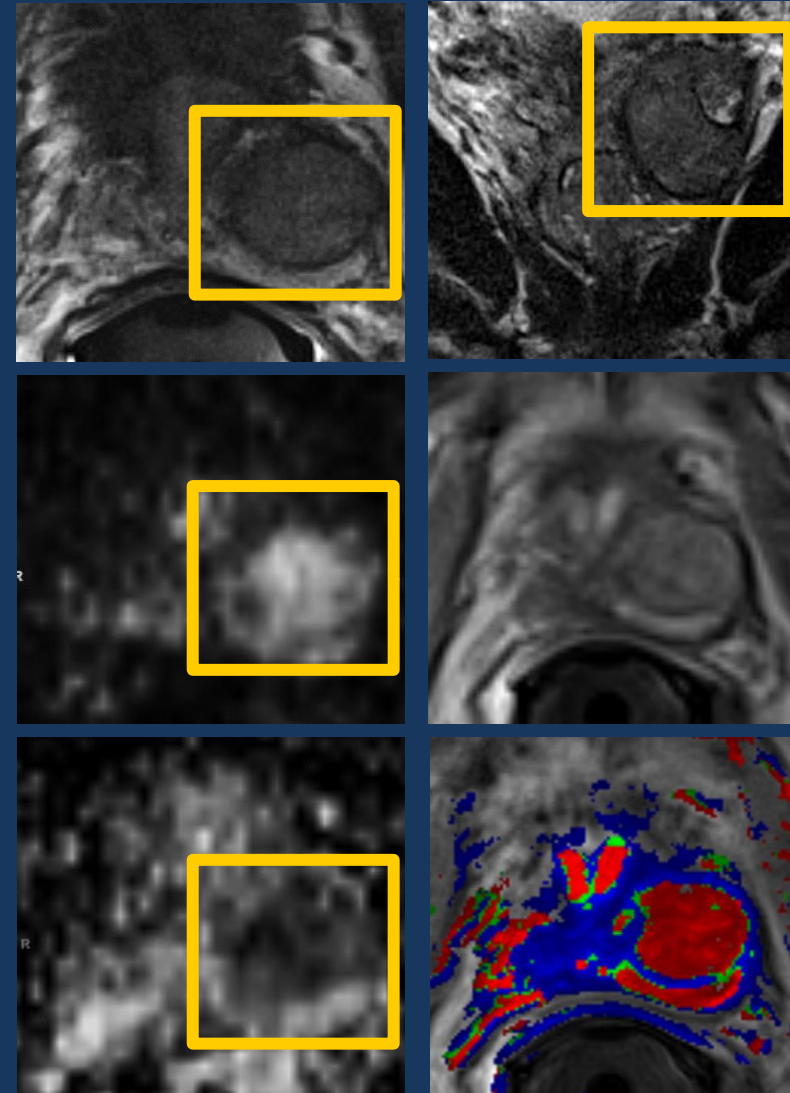
Transition Zone (TZ)



T2W	DWI	DCE	Overall
1	Any	Any	1
2	≤ 3	Any	2
	≥ 4	Any	3
3	≤ 4	Any	3
	5	Any	4
4	Any	Any	4
5	Any	Any	5



Nodule 25 mm



PI-RADS 5:
clinically significant
cancer highly likely

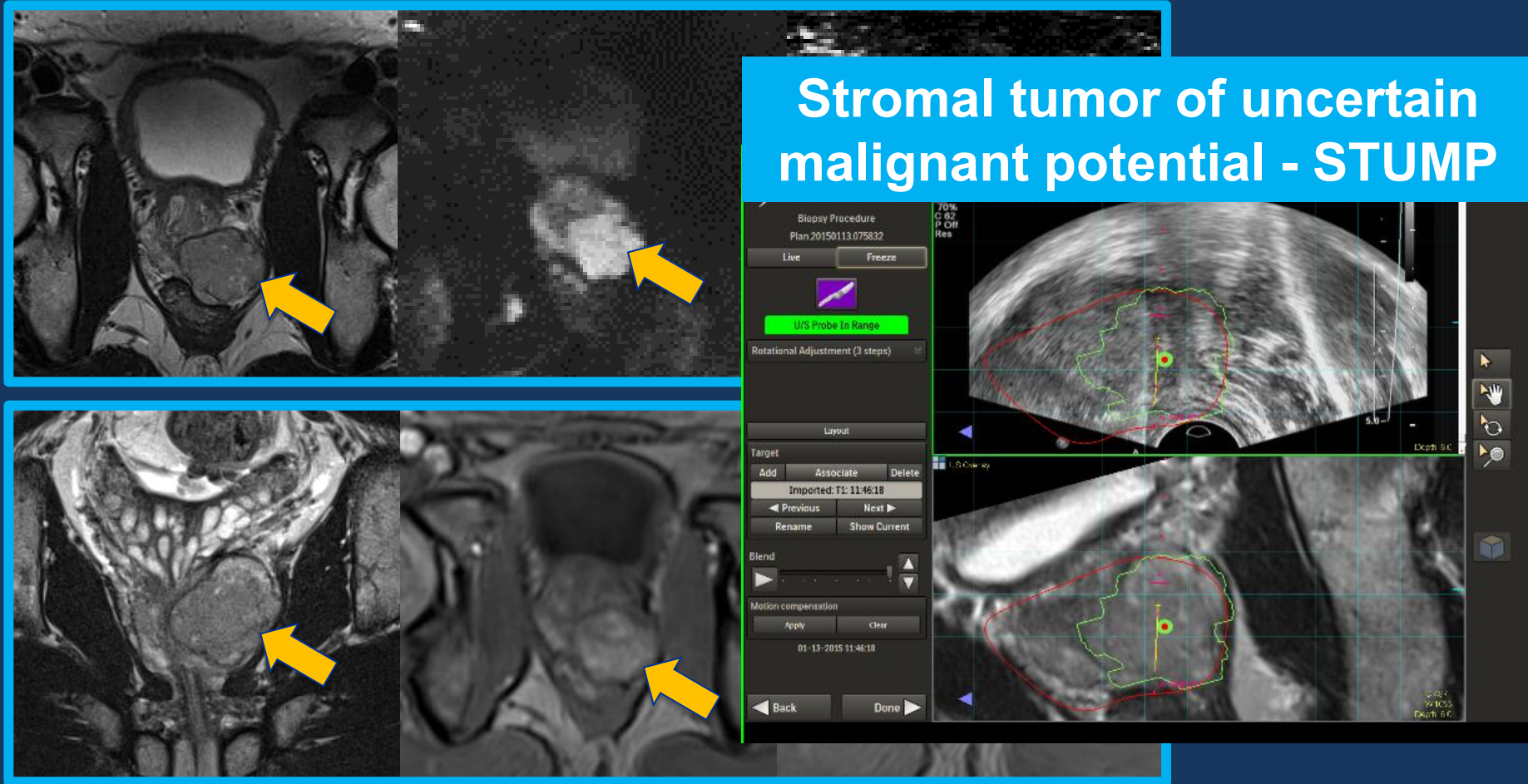
MR-TRUS fusion biopsy



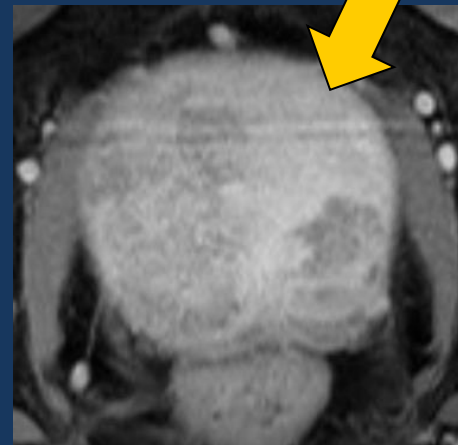
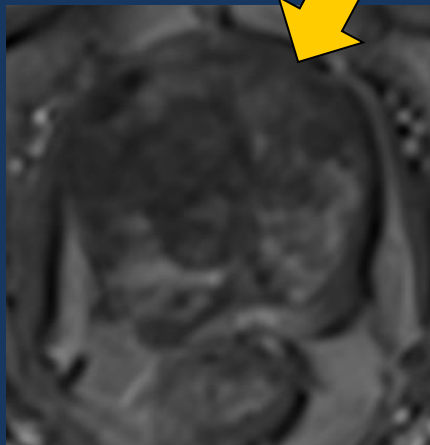
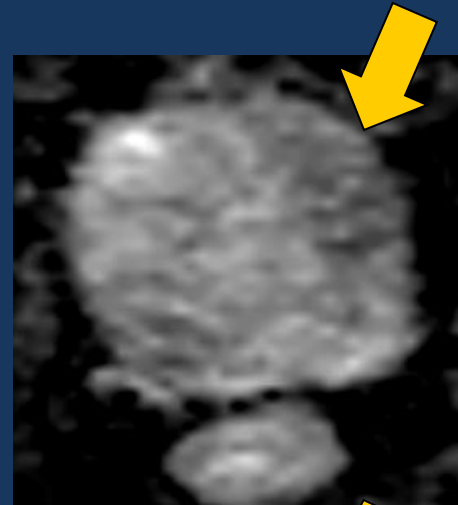
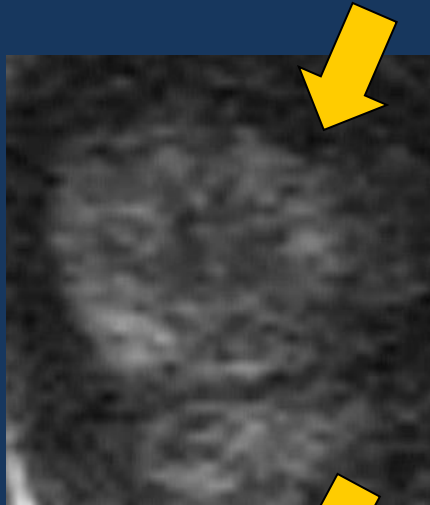
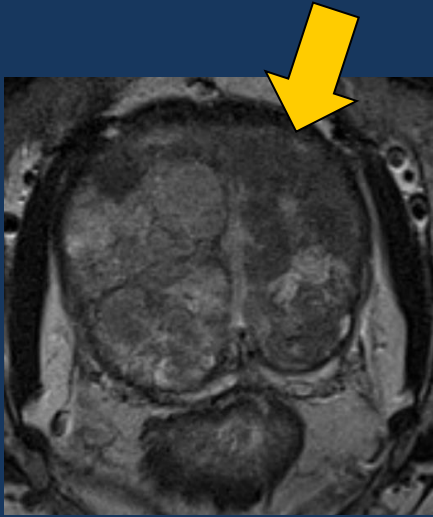
Elevated PSA with prior negative TRUS BX x 2.

Prostatic Duct Adenocarcinoma: Tumors analogous in their behaviors to Adenocarcinoma, **Gleason 4+4=8**. Large duct carcinoma, smooth borders without infiltration, frequently associated with conventional acinar carcinoma.

Encapsulated Eccentric Nodule



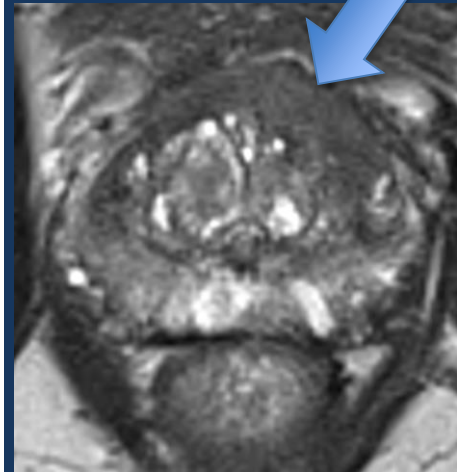
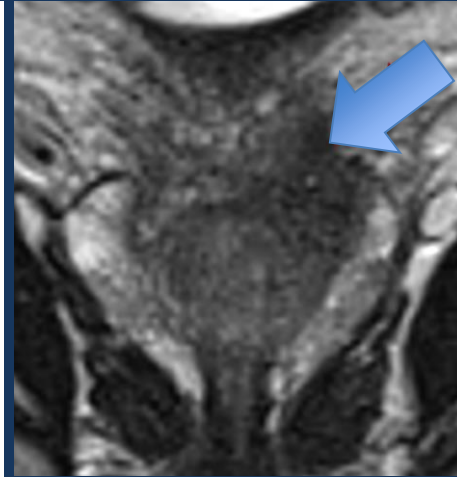
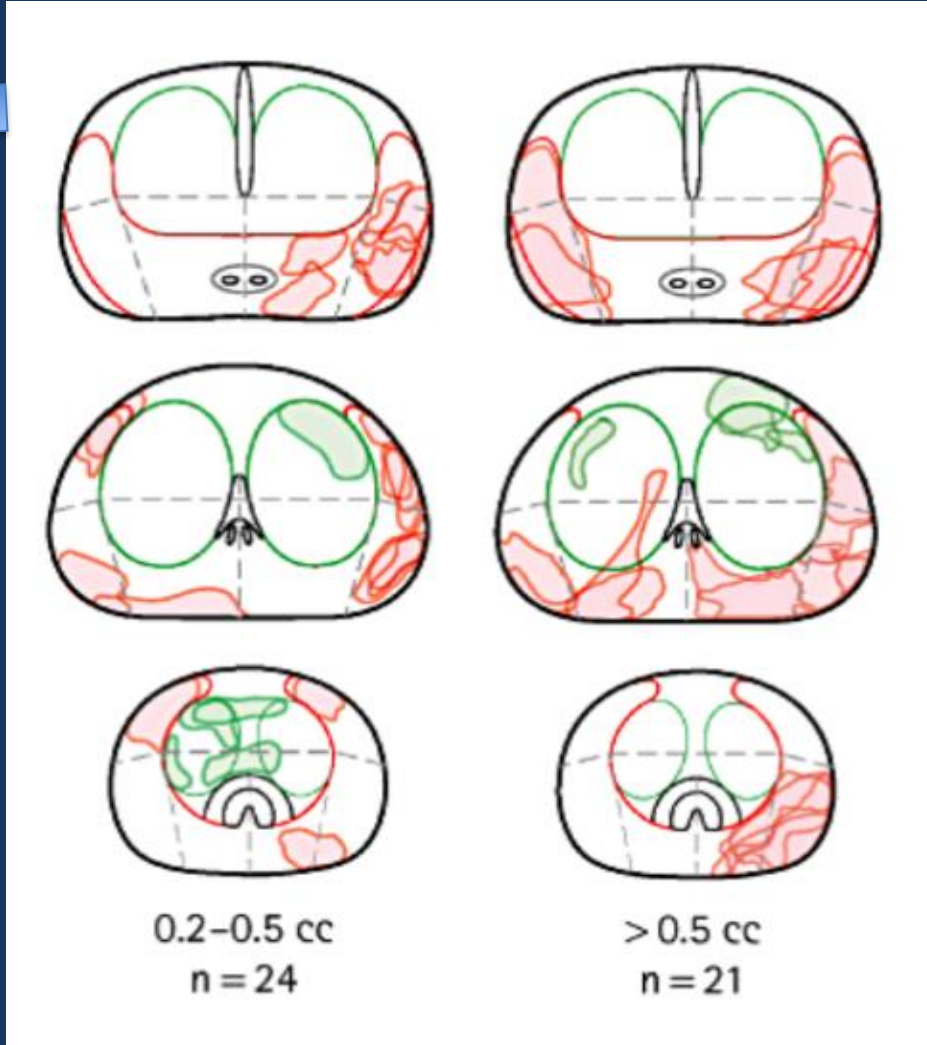
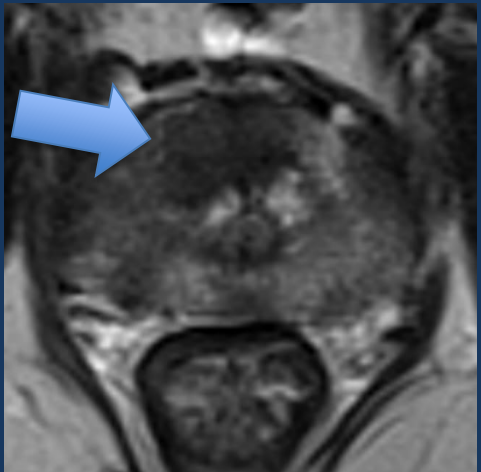
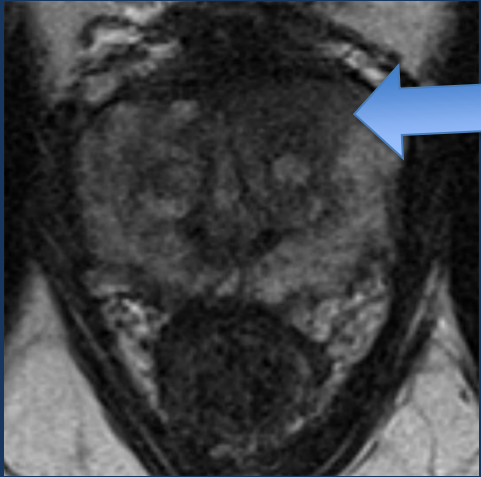
Stromal Expansion



Early DCE

Late DCE !!!

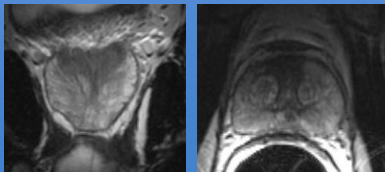
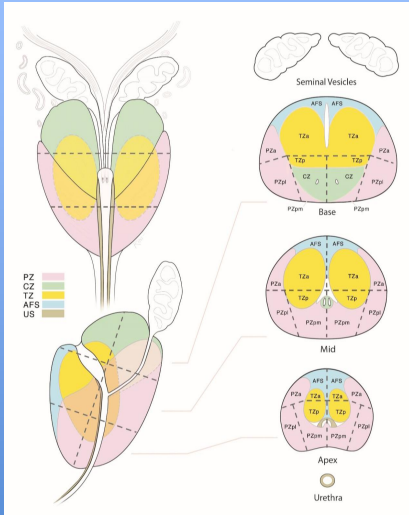
The Hidden Corners



Step-by-step Assessment

1

Anatomical Localization



2

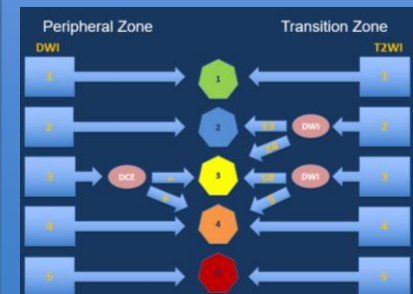
Qualitative Evaluation on T2WI, DWI (1-5 score) and DCE (positive/negative)

Score	Peripheral Zone (PZ)
1	Uniformly hyperintense (normal)
2	Linear, wedge-shaped, or diffuse mild hypointensity, usually indistinct margin
3	Non-circumscribed, rounded, mild hypointensity
4	Circumscribed, homogenous moderate hypointense focus/mass confined to prostate and <1.5 cm in greatest dimension
5	Same as 4 but ≥ 1.5 cm in greatest dimension or definite extraprostatic extension/invasive behavior

3

Overall PI-RADS Assessment

DWI	T2W	DCE	PIRADS Category
1	Any	Any	1
2	Any	Any	2
3	Any	-	3
		+	4
4	Any	Any	4
5	Any	Any	5



On Line Resources

PI-RADS (Prostate)

Crafted in collaboration between ACR, the AdMeTech Foundation and ESUR to improve early diagnosis and treatment of prostate cancer.

→ See PI-RADS



Using PI-RADS v2.1 for Prostate MRI Education Activity

Access CME



“PRIMER”

Overview and Learning Objectives

Primer for Using PI-RADS v2.1 for Prostate MRI

This educational activity was developed to provide radiologists with basic information about prostate MRI acquisition, interpretation and reporting.

The activity is divided into seven sections that can be reviewed linearly or nonlinearly to facilitate self-paced learning. Illustrative examples are used to describe normal prostate anatomy, the PI-RADS assessment categories, prostate cancer staging and caveats for imaging interpretation.

The basic elements of a structured prostate MRI report and the technical standards for image acquisition described in PI-RADS v2.1 are also reviewed. At the end of each section, important concepts are reviewed in knowledge checks. Links to supporting documents and other resources are provided at the end of the activity.

Access now

Learning Objectives

1. Outline the principles of PI-RADS v2.1 and the scoring system during the interpretation of mpMRI of the prostate.
2. Describe caveats for the interpretation of prostate cancer mimickers.
3. Demonstrate how to report imaging findings using the standardized format.
4. Cite ways to optimize prostate imaging protocols using the mpMRI principles to achieve the best diagnostic performance.

Claiming CME



Overall PI-RADS 3

ATLAS

Definition

3 - Intermediate (the presence of early signs of cancer is likely but not definitive)

PI-RADS 3 Atlas T2WI shows areas of mild low T2 in the peripheral zone bilaterally, with indistinct margins on the left (black arrow) and with more linear appearance on the right (white arrow).

A T2-weighted MRI image of a prostate gland. A black arrow points to an area of low signal intensity on the left side, and a white arrow points to a more linear area of low signal intensity on the right side. The image is surrounded by a dark border with various icons for navigation and zooming.

Prostate Cancer - Next Case

American College of Radiology

Pre-Assessment

Activity

Post-Assessment

*Required Program Evaluation

Refresh

78% Completed

Navigation Help

A diagram of a prostate gland with arrows pointing to specific areas. The diagram is divided into sections labeled T2a, T2b, T2c, T2d, T2e, T2f, T2g, T2h, T2i, T2j, T2k, T2l, T2m, T2n, T2o, T2p, T2q, T2r, T2s, T2t, T2u, T2v, T2w, T2x, T2y, T2z. The diagram is surrounded by a dark border with various icons for navigation and zooming.

Click any section below to start

Prostate Anatomy

PI-RADS Assessment

Caveats for Imaging Interpretation

Staging

Reporting

Technical Parameters

Resources & CME