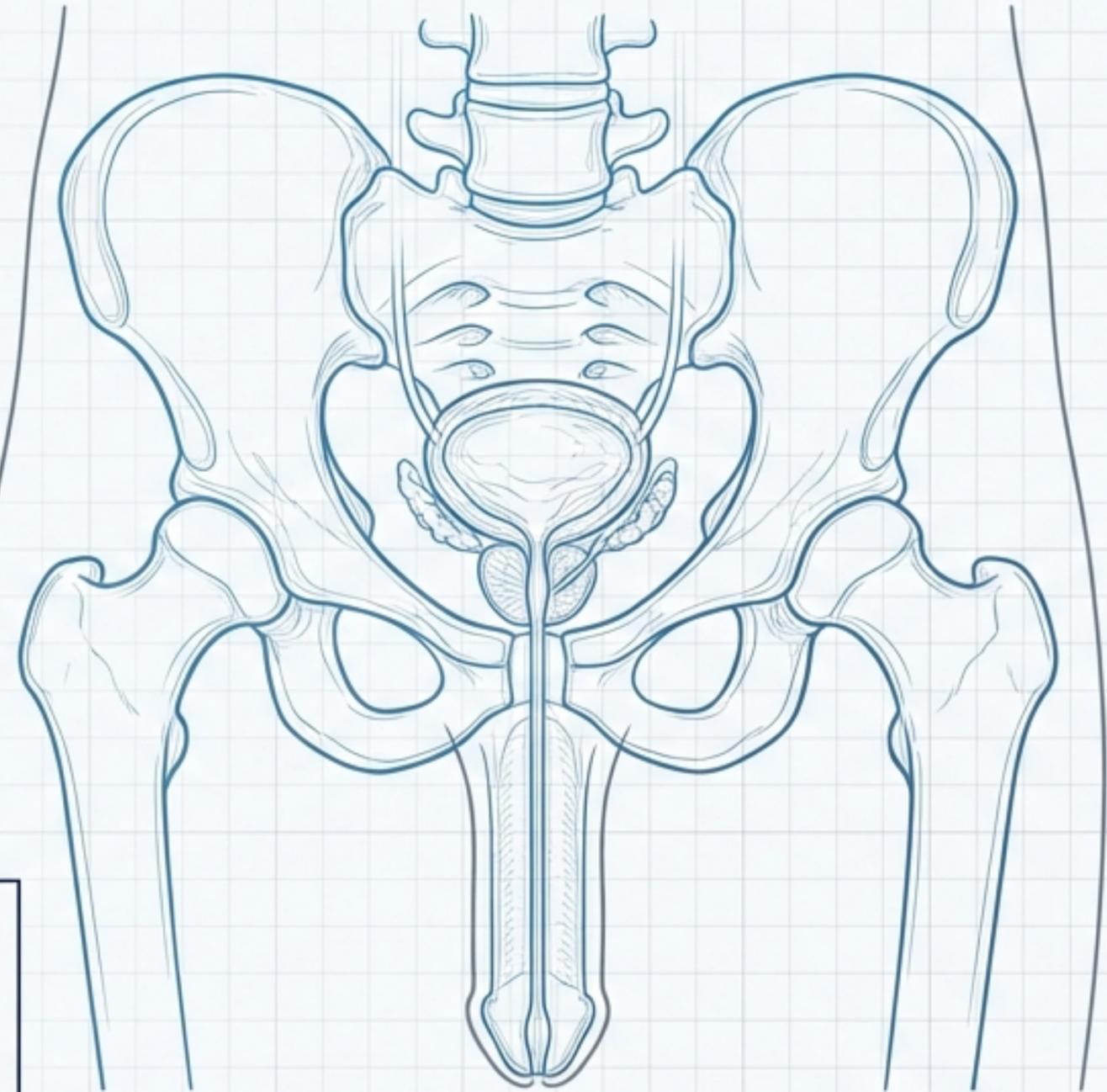


Multi-Modal Diagnostic Synthesis: Localized Prostate Cancer Recurrence

Integrating MRI, PSMA PET/CT, and
Targeted Biopsy Pathology

PATIENT STATUS : S/P Focal Laser Ablation (2018)
CURRENT PSA : 11.71 ng/mL
PRIMARY FINDING : Gleason 7 (Grade Group 3) with Intraductal Spread
CASE ID : S25-29994



Confirmed high-grade, localized recurrence requiring multidisciplinary intervention



MRI identified a growing 1.4 x 1.2 cm restricting lesion in the Right Anterior Apex.

PROSTATE VOL: 53.22 mL | CAPSULE: Intact



PSMA PET/CT confirmed high focal posterior uptake with absolutely NO evidence of distant metastatic spread.

METASTASIS: Negative | MAX SUV: 9.6



12-Core + Targeted TP Fusion Biopsy yielded Prostatic Adenocarcinoma across multiple zones.

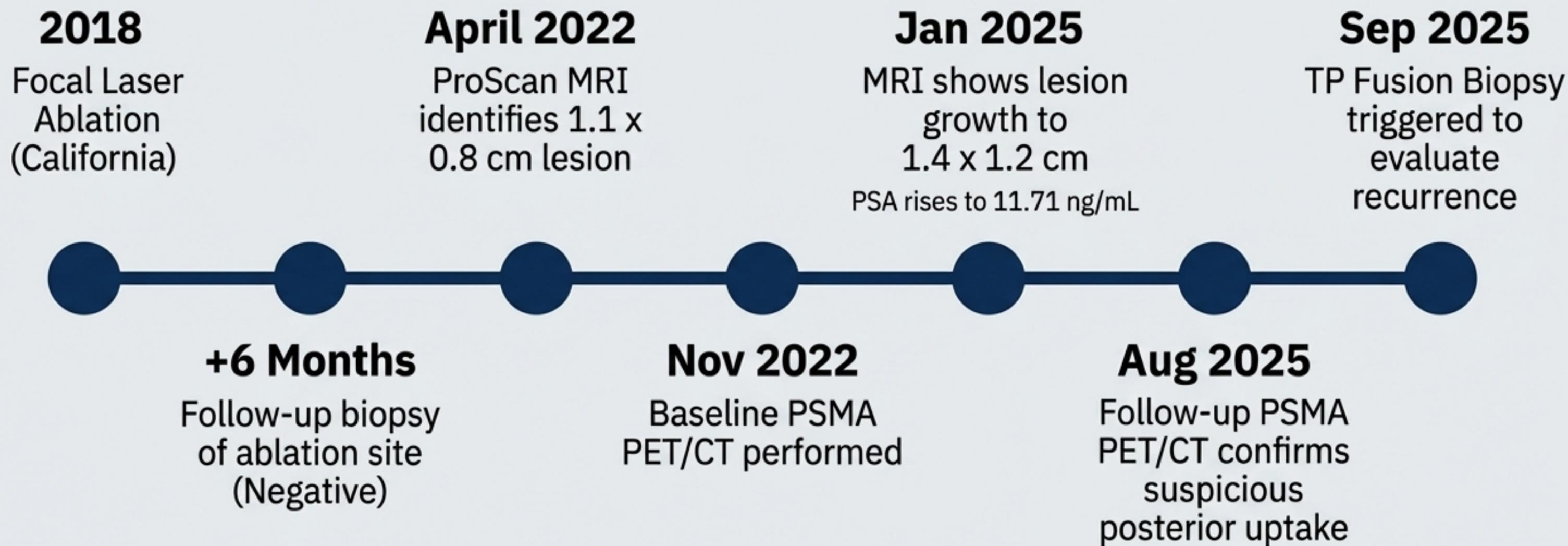
GLEASON: 4+3=7 & 3+4=7



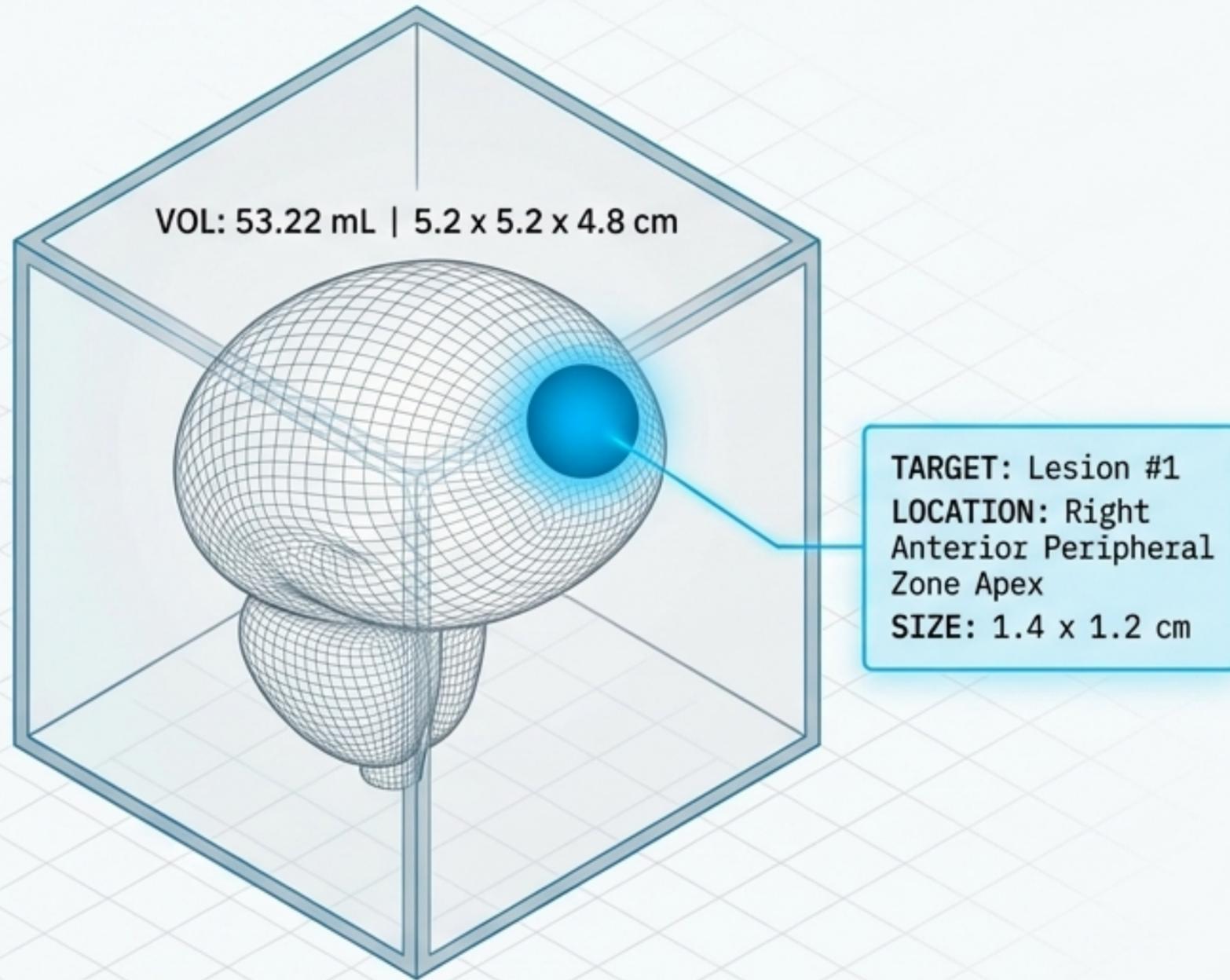
Significant tumor volume with aggressive architectural phenotypes.

INTRADUCTAL SPREAD: Present | PNI: Present

A seven-year progression from initial ablation to multi-focal recurrence.



MRI imaging isolates a distinct, restricting lesion in the anterior apex.



DIAGNOSTIC CRITERIA:

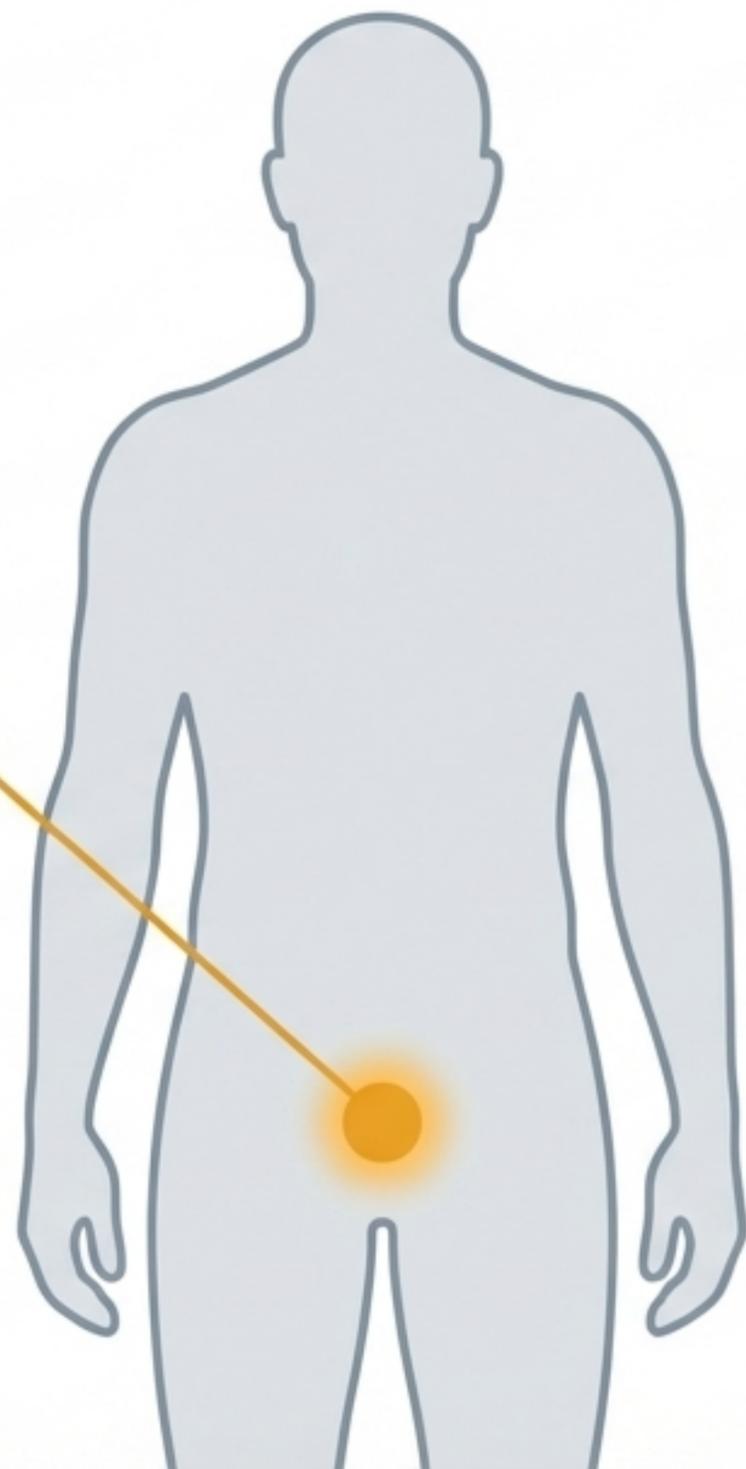
- DWI/ADC: Distinct Restriction
- High b1500: Bright Signal
- DCE: Focal Enhancement
- Capsule: Intact (No extracapsular extension)

SECONDARY FINDINGS:

- Post-ablation changes in right peripheral zone
- Moderate BPH in transition zone
- Diffuse bladder wall thickening
- Right seminal vesicle hemorrhage

PSMA PET/CT confirms high local metabolic activity with zero distant metastasis

UPTAKE HOTSPOT
Posterior aspect of
the prostate gland
MAX SUV: 9.6



SYSTEMIC CLEARANCE

- ✓ **Head and Neck:** No suspicious activity
- ✓ **Chest:** No suspicious activity
- ✓ **Bones:** No suspicious activity
- ✓ **Extremities:** No suspicious activity

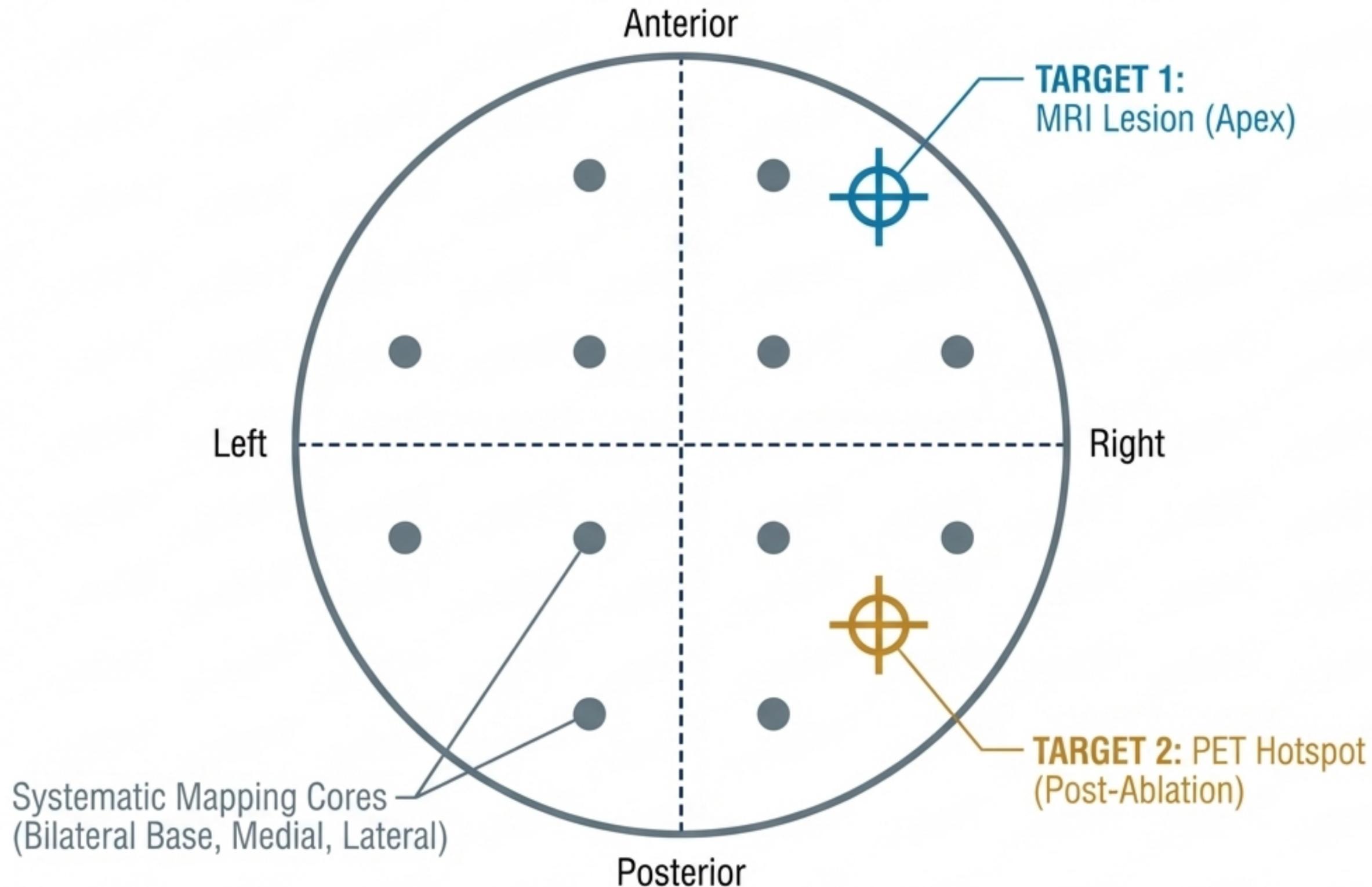
IMPRESSION: No evidence of metastatic disease.

Divergent anatomical and metabolic signals necessitated a comprehensive biopsy.

	MRI (Anatomical Map)	PSMA PET/CT (Metabolic Map)
Primary Modality	3D Anatomical & Diffusion	Molecular & Metabolic Uptake
Primary Target Identified	Right Anterior Apex (1.4 x 1.2 cm restricting lesion)	Posterior aspect of the prostate (SUVmax 9.6)
Diagnostic Blind Spots	Post-ablation posterior tissue showed “changes” but lacked distinct lesion clarity.	Lacks sub-centimeter spatial resolution for precise cellular grading.

SYNTHESIS: The recurrence is likely multifocal. A Transperineal (TP) Fusion biopsy is required to target BOTH the anterior MRI lesion and the posterior PET uptake zone.

Deploying a 12-core mapping strategy alongside targeted lesion sampling.



SPECIMEN PROCESSING

Pathology processed 12 total specimen containers (Cores A through L).

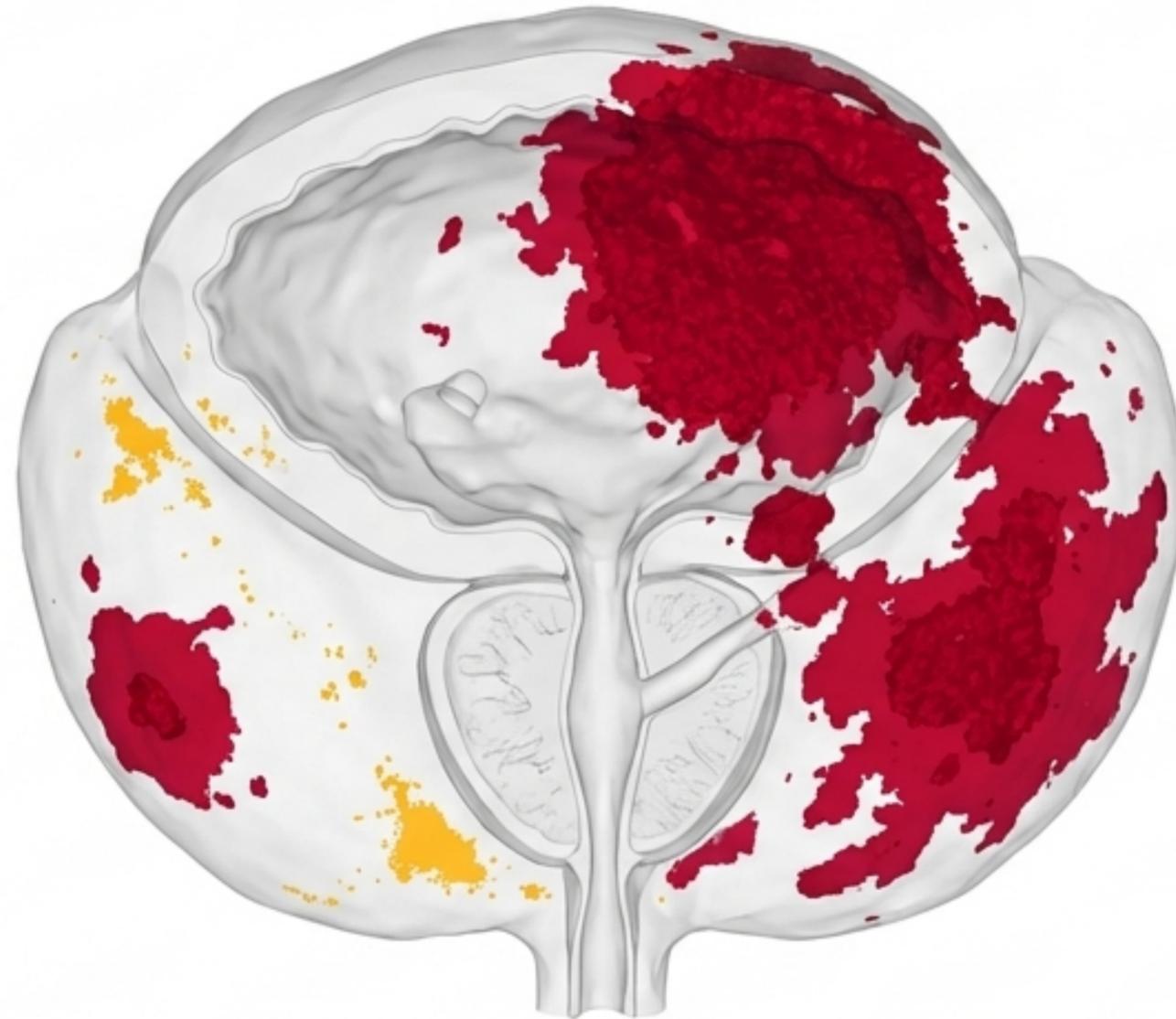
Objectives:

- Measure linear tumor amount (mm).
- Calculate total tumor volume percentages.
- Identify cellular atypia via immunohistochemical staining.
- Confirm presence of Intraductal Spread and Perineural Invasion.

Pathology Result Dashboard: High tumor volume concentrated in right apex and posterior zones.

CORE LOCATION	DIAGNOSIS	GLEASON	TUMOR VOL %	CRITICAL FEATURES
Target K (MRI R Ant Apex)	Adenocarcinoma	4+3=7	Up to 90%	Intraductal Spread (5 of 6 cores positive)
Target L (PET R Posterior)	Adenocarcinoma	4+3=7	Up to 90%	Intraductal Spread (3 of 5 cores positive)
Core B (R Post Lateral)	Adenocarcinoma	4+3=7	60%	Intraductal Spread, Perineural Invasion
Core F (L Post Medial)	Adenocarcinoma	4+3=7	70%	Intraductal Spread
Core G (L Post Lateral)	Adenocarcinoma	3+4=7	20%	Intraductal Spread
Cores E, H, I, J	High-Grade PIN	N/A	N/A	Pre-malignant changes
Cores C, D	Benign	Negative	0%	Normal prostatic tissue

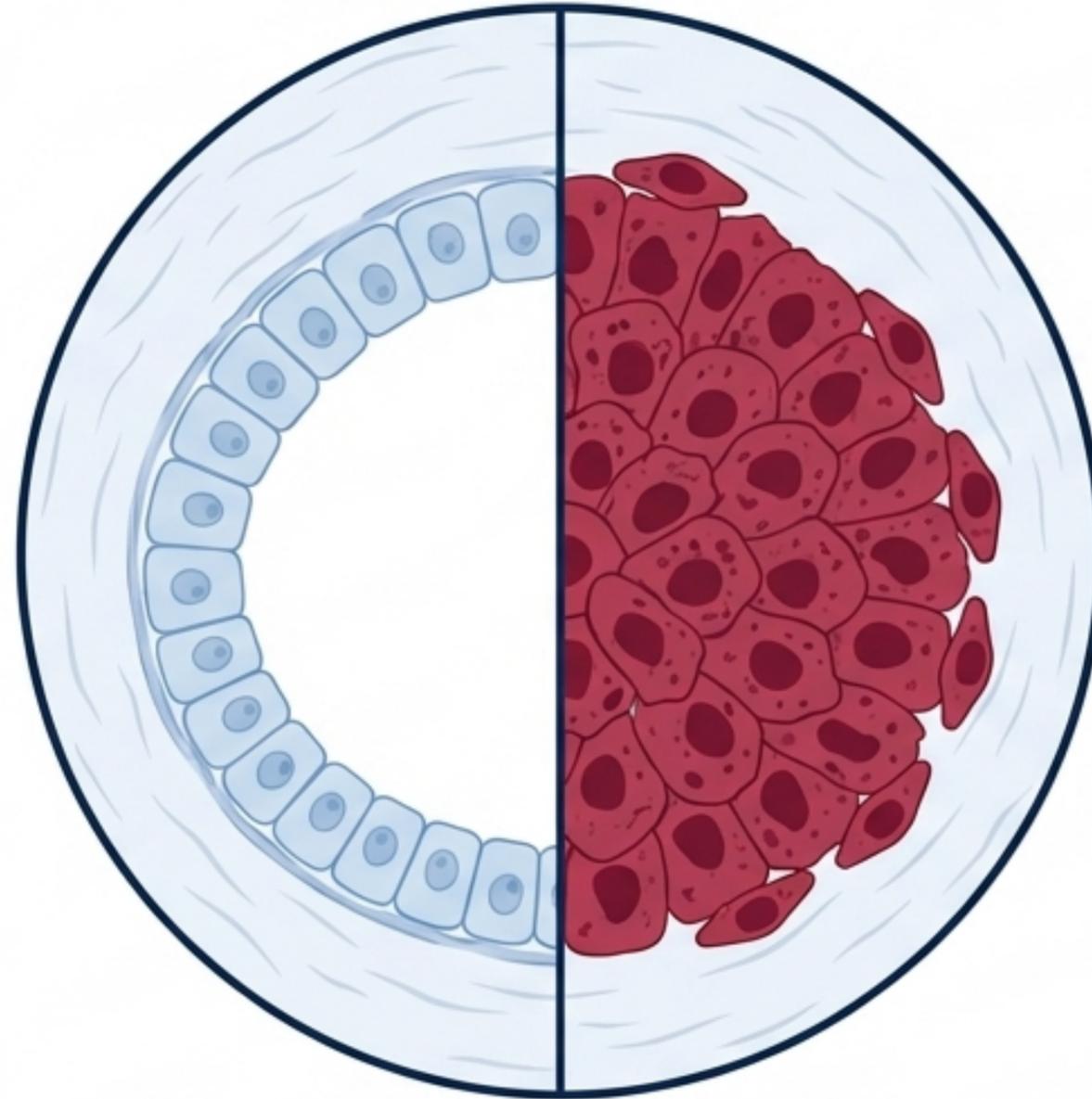
Disease distribution confirms multi-focal recurrence spanning targeted and peripheral zones



INSIGHT: Systematic mapping proves the disease has expanded beyond the initial 2018 right-sided ablation site, aggressively colonizing both the anterior apex and contralateral posterior tissue.

Cellular Pathology Deep Dive: The presence and mechanism of **Intraductal Spread**.

**Normal /
High-Grade PIN**



**Intraductal
Carcinoma**

CELLULAR MORPHOLOGY

Large atypical glands exhibit complex architectural complexity and cytologic atypia far beyond standard high-grade PIN.

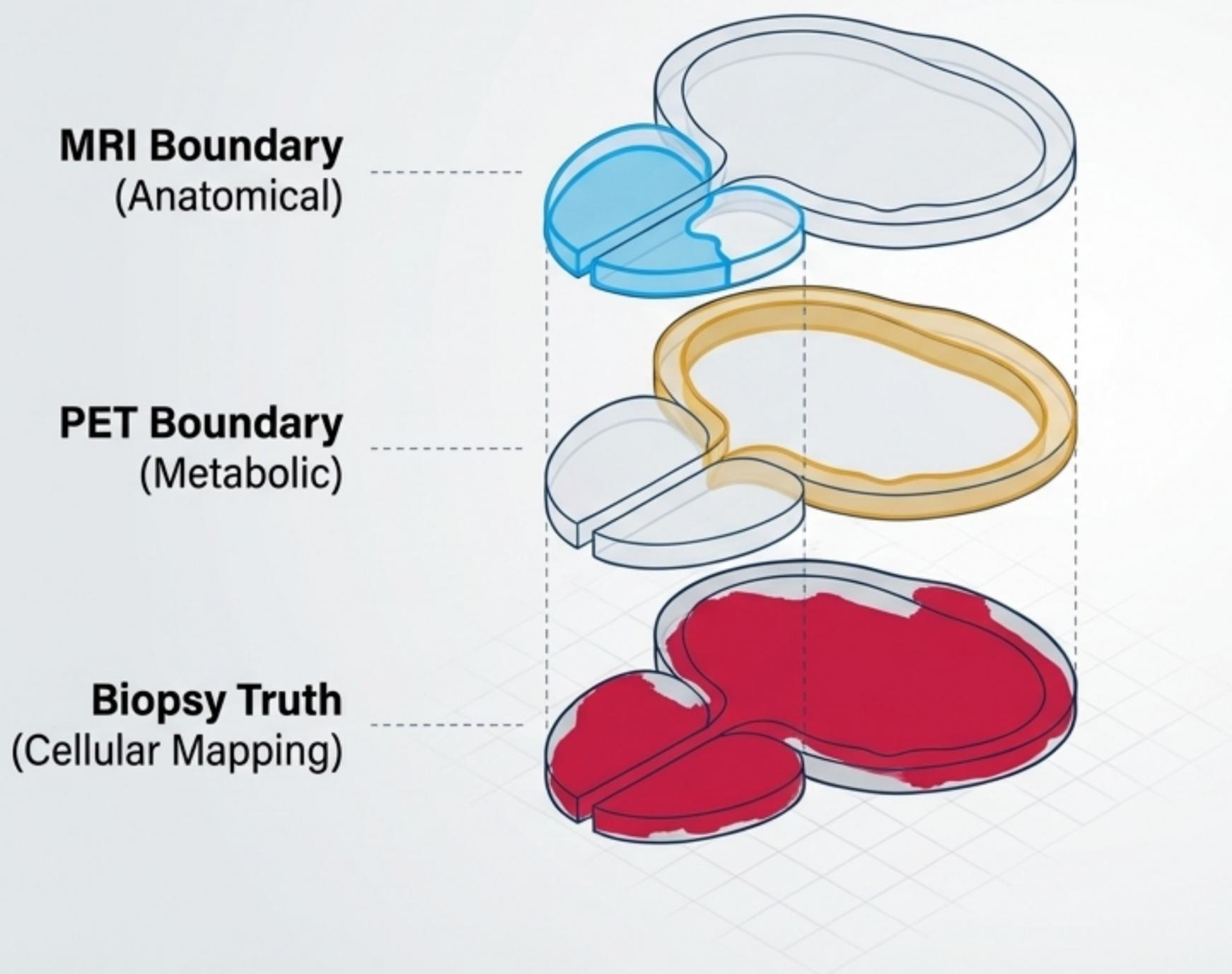
MARKER STAINING

PIN4 staining confirms the absence of basal cell markers alongside significant overexpression of AMACR.

PROGNOSTIC VALUE

Intraductal spread is explicitly graded as Gleason pattern 4, indicating a highly aggressive local phenotype associated with Perineural Invasion.

The Integrated Disease Map: Multi-modal convergence confirms exact tumor boundaries



SYNTHESIS STATEMENT

No single imaging modality captured the full extent of the recurrence.

The MRI identified the apex.
The PET identified the posterior.

Only through multi-modal integration and 12-core mapping is the true, multi-focal tumor burden fully revealed.

Final Diagnostic Staging & Handoff for Multidisciplinary Review

CONFIRMED DISEASE STATUS

- Localized, multi-focal recurrence (post-2018 focal ablation).
- High-grade Pathology: Gleason 4+3=7 (Grade Group 3).
- Risk Factors Present: Extensive intraductal spread and perineural invasion.
- Systemic Status: Zero evidence of metastasis. Nodes, bone, and organs are clear.

ANATOMICAL INTEGRITY

- Prostate volume stable at 53.22 mL.
- Prostate capsule remains entirely intact.
- No extracapsular extension noted on MRI.
- Seminal vesicles clear of tumor invasion (hemorrhage noted).