

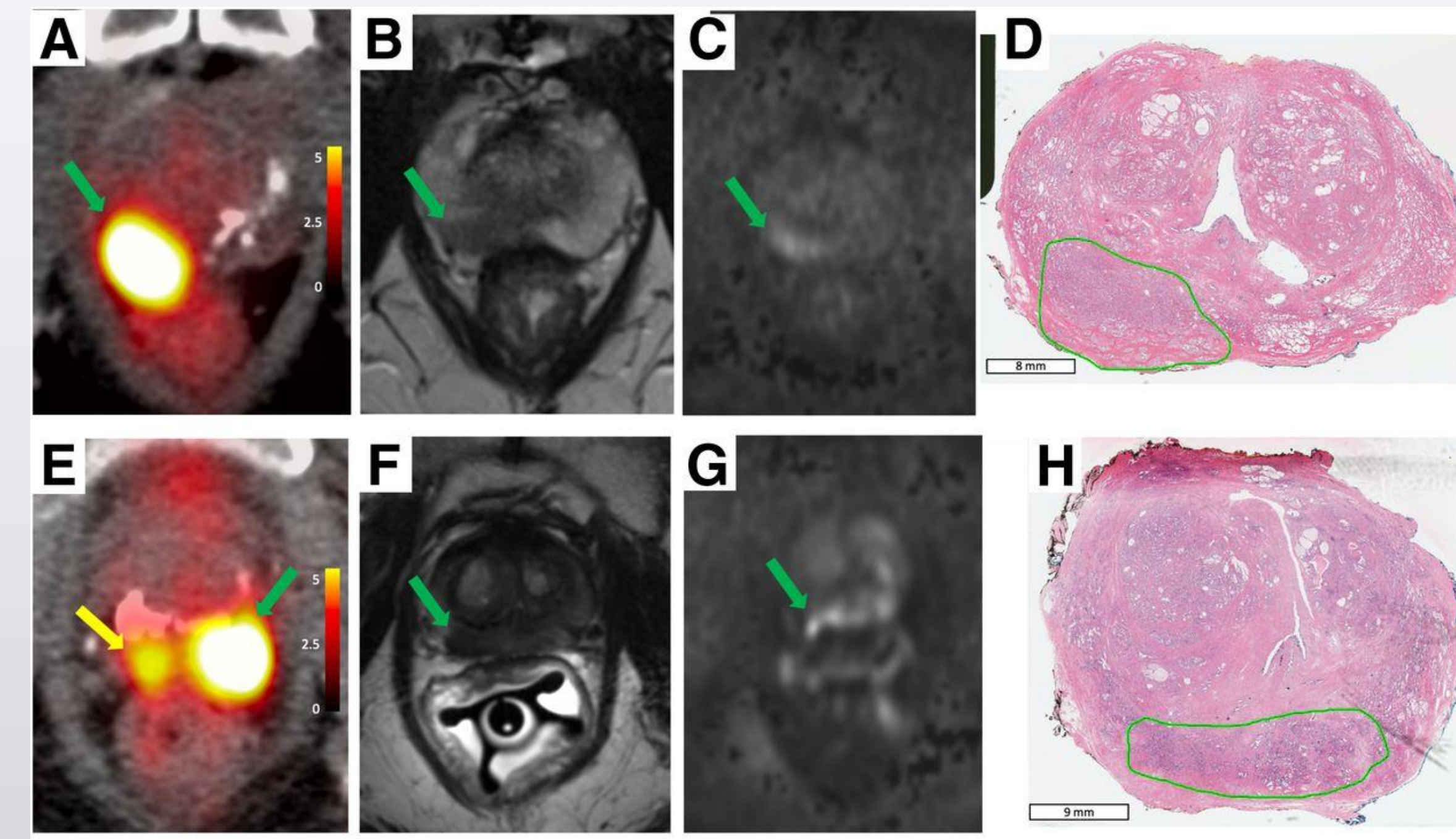


# PSMA PET/CT: Normal Biodistribution, Benign Variants, and Non-Prostatic Uptake Pitfalls

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## INTRODUCTION

- Prostate-specific membrane antigen (PSMA) PET/CT has become a cornerstone imaging modality for the detection, staging, and restaging of prostate cancer due to its high sensitivity and specificity.
- PSMA is a transmembrane glycoprotein markedly overexpressed in prostate cancer cells and tumor neovasculature, particularly in high-grade and metastatic disease.
- Radiotracers such as Ga-68 PSMA-11 and F-18-labeled PSMA agents enable superior lesion detection compared with conventional imaging.
- Accurate interpretation of PSMA PET/CT requires a thorough understanding of normal physiologic biodistribution, common benign variants, and non-prostatic causes of tracer uptake to avoid diagnostic pitfalls.



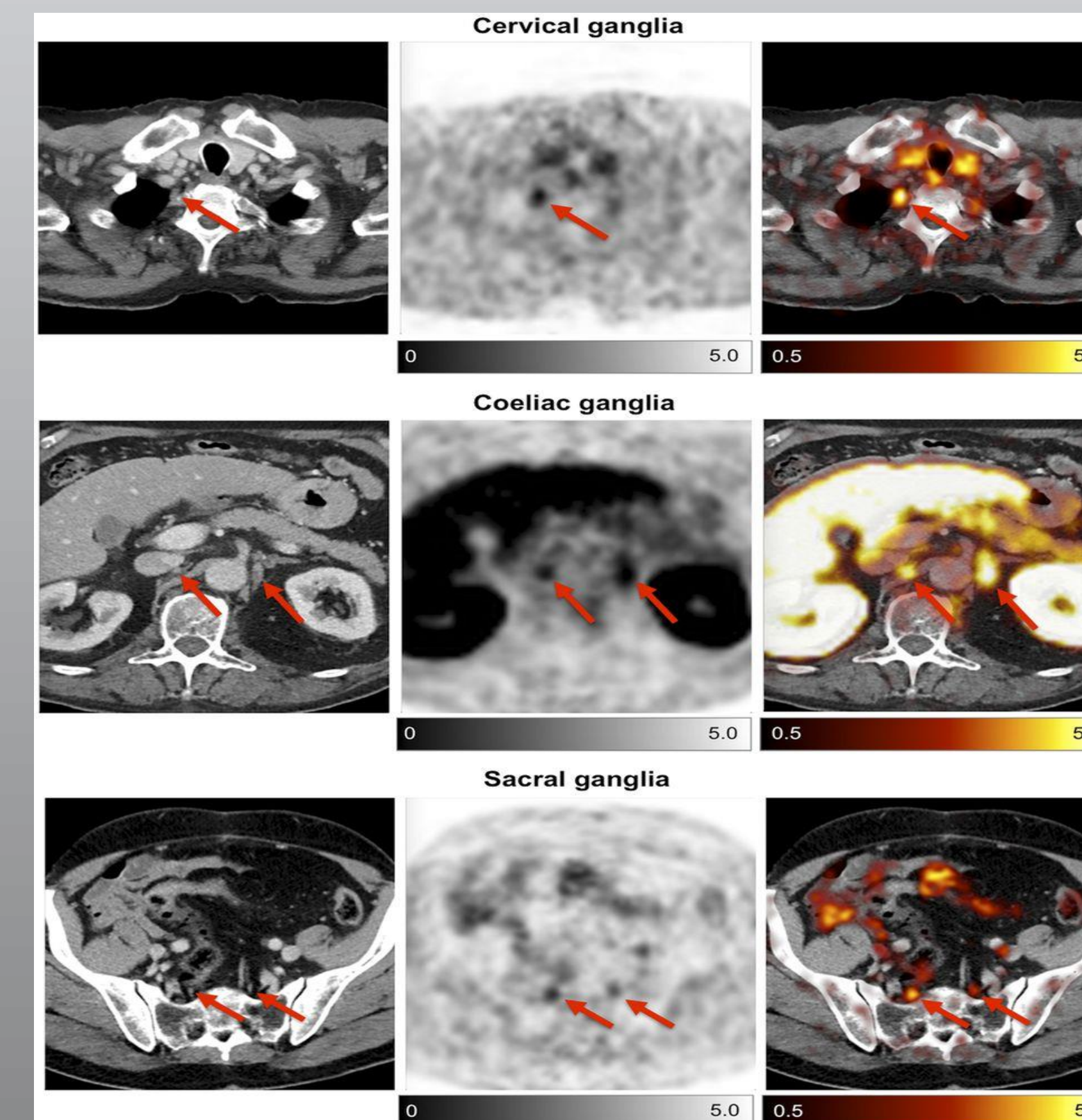
Primary Prostate Cancer: Axial fused PSMA PET/CT demonstrates intense focal uptake within the prostate gland corresponding to a primary prostate malignancy.

## RESULTS

- Normal PSMA biodistribution demonstrates intense physiologic uptake in the salivary and lacrimal glands, kidneys, and urinary bladder.
- Moderate uptake in the liver, spleen, and small bowel; and variable mild uptake in sympathetic ganglia, adrenal glands, and nasopharynx.
- Abnormal uptake patterns suspicious for malignancy include focal tracer activity exceeding background liver uptake, asymmetric distribution, uptake in unexpected locations, and correlation with structural abnormalities on CT.
- While prostate cancer remains the most common cause of pathologic PSMA uptake, non-prostatic malignancies and benign or inflammatory conditions may also demonstrate PSMA avidity, representing important diagnostic pitfalls.

## METHODS

- This educational exhibit reviews the biologic mechanism of PSMA-targeted radiotracer uptake and illustrates normal physiologic biodistribution patterns on PSMA PET/CT.
- Representative clinical cases are used to demonstrate common sites and imaging characteristics of focal abnormal uptake, including prostate bed recurrence, nodal disease, osseous metastases, and visceral involvement.
- Common interpretive pitfalls, such as sympathetic ganglia uptake and benign musculoskeletal findings, are highlighted.
- Correlation with CT morphology and clinical context is emphasized to aid in accurate diagnosis.



Physiologic Sympathetic Ganglia Uptake (Pitfall): Axial fused PSMA PET/CT shows focal uptake in the celiac ganglia without corresponding nodal enlargement on CT, representing a common interpretive pitfall.

## CONCLUSION

- PSMA PET/CT offers exceptional sensitivity for detecting prostate cancer and its metastatic spread.
- However, PSMA expression is not entirely specific.
- Familiarity with normal physiologic uptake patterns, benign variants, and non-prostatic causes of PSMA avidity is essential for accurate image interpretation.
- Careful correlation with CT findings and clinical information is critical to minimize false-positive interpretations and optimize patient management.

## REFERENCES

