





PSMA PET Imaging and Unspecific Bone Uptake(UBUs) Diagnostic Challenge and Role of the BUMP Score in Urologic Practice

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Introduction

PSMA PET-CT has revolutionized prostate cancer imaging with high sensitivity and specificity, yet unspecific bone uptakes (UBUs) remain a frequent pitfall across all PSMA tracers, including [18F]PSMA-1007, [68Ga]PSMA-11, and [18F]rhPSMA-7. While many UBUs are benign, up to 18% may reflect true metastases, especially in the axial skeleton, as reported by Bauckneht et al. (2024).

UBUs are often overlooked as artifacts, risking undertreatment, particularly in oligometastatic prostate cancer (omPCa), where missing malignant UBUs could deny patients curative options like SBRT or MDT. In Bauckneht et al. (2024), analysis of 448 [18F]PSMA-1007 bone lesions revealed 41.9% were metastatic, underscoring the need for precise evaluation. Our poster introduces imaging features and the Bone Uptake Metastatic Probability (BUMP) score—a structured approach that helps differentiate benign from malignant UBUs—to improve interpretation of [18F]PSMA-1007 PET and guide treatment decisions.

PSMA Agent	UBU Incidence	Common Sites	Clinical Notes
[18F]PSMA-1007	11.6%-71.7% (highest)	Ribs > Pelvis > Spine	Highest rate; low urinary clearance enhances bone visibility but increases false positives.
[68Ga]Ga-PSMA-11	0%-23.9%	Ribs > Spine	Lower incidence but still notable in ribs/spine. False positives possible.
[18F]DCFPyL	Approximately 19.8%	Ribs > Spine	Moderate rate; spine uptake should be evaluated carefully.
[18F]rhPSMA-7	Moderate (up to ~11.1%)	Ribs ≈ Spine	Moderate incidence with similar pattern to Ga-PSMA-11. Limited data.
The Homunculus of unspecific bone uptakes associated with PSMA-targeted tracers: a systematic review-based definition. Eur J Nucl Med			

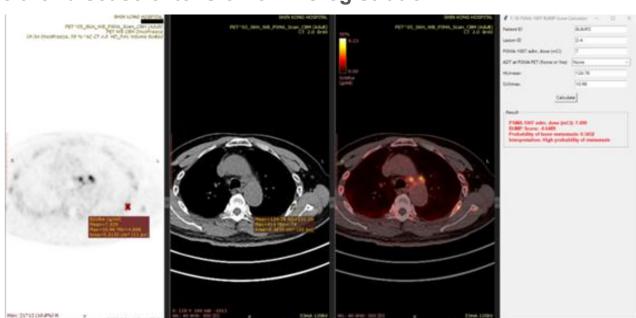
Methods

Mol Imaging (2024). doi.org/10.1007/s00259-024-06797-5

[18F]PSMA-1007 (RadeluminTW® injection, 259 MBq) PET-CT scans (SIEMENS AI PET Biograph Vision) offer high-resolution imaging with minimal bladder interference, but are susceptible to unspecific bone uptakes (UBUs). The BUMP score addresses this challenge by integrating SUVmax, CT density (HUmean), and ADT status to estimate the metastatic probability of each bone lesion. In Bauckneht et al. (2024), BUMP demonstrated excellent diagnostic performance (AUC 0.92) and maintained accuracy even in non-sclerotic lesions, with 88% specificity at a 0.25 cutoff—particularly useful for less experienced readers.

Results

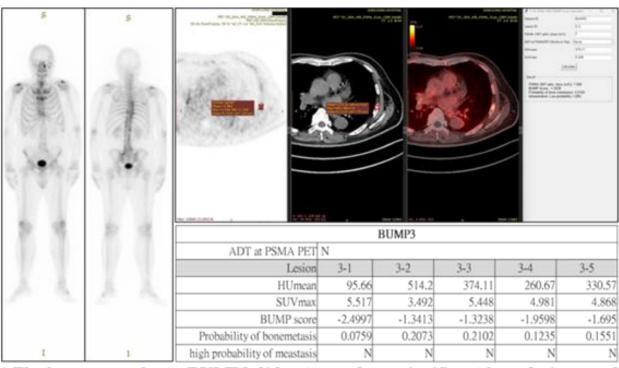
We applied our BUMP score calculator in four patients undergoing [18F]PSMA-1007 PET-CT. One patient had no UBUs, while 15 lesions were analyzed in the remaining three cases. Three lesions (20%) exceeded the malignancy threshold, but only one (6.7%) required follow-up due to proximity to a PSMA-avid lung nodule, likely representing either disease extension or misregistration.



↑A UBU lesion in case BUMP2 was listed as a lesion requiring follow-up because it was adjacent to a high SUV lesion in the lung.

Results (Continued)

All five lesions in case BUMP3 were classified as low risk (probability <0.25), correlating with negative bone scans, low PSA levels, and benign imaging features. Overall, the BUMP score effectively filtered benign UBUs and aligned with expert interpretations, highlighting its clinical utility in guiding metastasis-directed therapy decisions and improving [18F]PSMA-1007 PET accuracy.



↑ The bone scan of case BUMP3 did not reveal any significant bone lesions, and our UBUs score calculator did not reveal any UBUs lesions worth tracking.

Importantly, lesions with higher SUVmax, axial skeletal location, and sclerotic morphology on CT were more suggestive of malignancy. The application of the BUMP score is particularly advantageous with [18F]PSMA-1007 PET-CT because this tracer is prone to higher rates of UBUs due to its minimal urinary clearance. By quantifying risk and standardizing interpretation, the BUMP model enhances diagnostic confidence—even for less experienced readers—and supports individualized treatment strategies such as metastasis-directed therapy (MDT) or stereotactic body radiotherapy (SBRT).

Conclusion

All PSMA tracers can produce UBUs, and a non-negligible portion may be metastatic. Therefore, vigilance is essential during interpretation, particularly in the management of oligometastatic prostate cancer.Among PSMA tracers, [18F]PSMA-1007 is especially valuable for bone metastasis detection due to its high spatial resolution and minimal bladder interference, outperforming conventional bone scans like Tc-99m in both sensitivity and specificity. However, its higher propensity for UBUs necessitates careful assessment. Utilizing the BUMP score with [18F]PSMA-1007 significantly improves the accuracy of PET-CT interpretation by providing a systematic approach to differentiate benign from malignant UBUs, thus guiding patient management optimal and avoiding both overtreatment and undertreatment

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