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**Incidental Malignancies identified during staging for Prostate Cancer with <sup>68</sup>Ga -PSMA HBED-  
CC PET imaging**

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**Abstract**

The rapid uptake of 68Ga Prostate-Specific Membrane Antigen (PSMA) HBED-CC PET imaging for prostate cancer staging has led to concerns regarding its specificity, with uptake in both malignant and non-malignant tissues. We describe three separate malignancies identified on 68Ga PSMA HBED-CC PET imaging. The misnomer of “prostate specific membrane antigen” is demonstrated by this case and highlights the importance of continued investigation of the potential role for 68Ga PSMA HBED-CC PET in other malignancies.

**Key Words**

Urological Malignancies; Nuclear Medicine; Prostate; Kidney; Ga68 PSMA

Rapid uptake of  $^{68}\text{Ga}$  Prostate-Specific Membrane Antigen HBED-CC PET (PSMA PET) imaging for prostate cancer staging has led to concerns regarding its specificity [1].

A 67 year old male (cT2b, PSA 9.6ng/ml) was staged with PSMA PET. Imaging revealed four separate lesions in the prostate [A], left thyroid [B], right kidney [C] and left posterior iliac crest [D] [Figure 1]. Histology confirmed Gleason 4+4=8 prostate cancer, papillary carcinoma of the thyroid, Grade 3 clear cell renal cell carcinoma (pT3aN0) and a benign bone on biopsy of the iliac crest.

The misnomer of “prostate specific” membrane antigen is demonstrated by this case and highlights the importance of continued investigation of the potential role for PSMA PET in other malignancies and histologic confirmation of identified lesions [3]. In a meta-analysis of 1309 patients, the reported sensitivity and specificity of PSMA PET were both 86% on a per-patient analysis [4]. Various other PET tracers for staging have been evaluated in systematic reviews (Tracer/sensitivity/specificity: 11C-Choline/84%/79% [5]; 18F-Choline/62%/92% [6]; 18F-FDG/62% risk of malignancy [7]). The evidence to date suggests that whilst PSMA PET has improved sensitivity and specificity to other tracers, it should be used with caution due to false positives as per NCCN guidelines.

## **References**

1. Silver DA, Pellicer I, Fair WR, Heston WD, Cordon-Cardo C. Prostate-specific membrane antigen expression in normal and malignant human tissues. *Clinical Cancer Research*. 1997; 3(1):81-5.
2. Maurer T, Eiber M, Schwaiger M, Gschwend JE. Current use of PSMA-PET in prostate cancer management. *Nat Rev Urol*. 2016;13(4):226-35.

3. Rhee H, Blazak J, Tham C, Ng K, Shepherd B, Lawson M et al. Pilot study: use of gallium-68 PSMA PET for detection of metastatic lesions in patients with renal tumour. *EJNMMI Research*. 2016;6(1).
4. Perera M, Papa N, Christidis D, Wetherell D, Hofman MS, Murphy DG, et al. Sensitivity, Specificity, and Predictors of Positive 68Ga–Prostate-specific Membrane Antigen Positron Emission Tomography in Advanced Prostate Cancer: A Systematic Review and Meta-analysis. *European Urology*. 2016;70(6):926-37
5. Umbehr M, Müntener M, Hany T, Sulser T, Bachmann L. The Role of 11C-Choline and 18F-Fluorocholine Positron Emission Tomography (PET) and PET/CT in Prostate Cancer: A Systematic Review and Meta-analysis. *European Urology*. 2013;64(1):106-117.
6. Poulsen, M.H., et al. [18F]fluoromethylcholine (FCH) positron emission tomography/computed tomography (PET/CT) for lymph node staging of prostate cancer: a prospective study of 210 patients. *BJU Int*, 2012. 110: 1666.
7. Bertagna F, Sadeghi R, Giovanella L, Treglia G. Incidental uptake of 18F-fluorodeoxyglucose in the prostate gland. *Nuklearmedizin*. 2014;53(6):249-258.

**Figure 1:** Gleason 4+4=8 prostate cancer (A); avid papillary thyroid carcinoma (B); pT3aN0 clear cell renal cell carcinoma (C); benign bony lesion in the left posterior iliac crest (D).