^{68}Ga-PSMA PET/CT and ^{18}F-FDG PET/CT in Renal Cell Carcinoma

Ew-Jun Chen, MSc,† Teik Hin Tan, MD,*† Ming Tsuey Chew, PhD,* and Ping Ching Chye, MD‡*

Abstract: Recent case reports and series have demonstrated the usefulness of ^{68}Ga/^{18}F-PSMA PET/CT in restaging recurrent renal cancer after nephrectomy. We presented a case of a patient with renal mass who had undergone both ^{18}F-FDG and ^{68}Ga-PSMA PET/CT for diagnosis and staging. Concordant tracer uptake in the primary tumor and metastatic lesions was demonstrated by both radiotracers. Final histopathological reports revealed clear cell renal cell carcinoma. Furthermore, unusual left metacarpal bone metastasis was also detected.

Key Words: ^{68}Ga-PSMA;, ^{18}F-FDG;, clear cell renal carcinoma;, bone lytic lesions

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From the *Centre for Biomedical Physics, School of Healthcare and Medical Sciences, Sunway University; †Nuclear Medicine Centre, and ‡Department of Orthopaedic Oncology, Sunway Medical Centre, Petaling Jaya, Malaysia.

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Correspondence to: Teik Hin Tan, MD, Nuclear Medicine Centre, Sunway Medical Centre. No. 5 Jalan Lagoon Selatan, Bandar Sunway, 47500 Petaling Jaya, Selangor Darul Ehsan, Malaysia. E-mail: tanth@sunmed.com.my.

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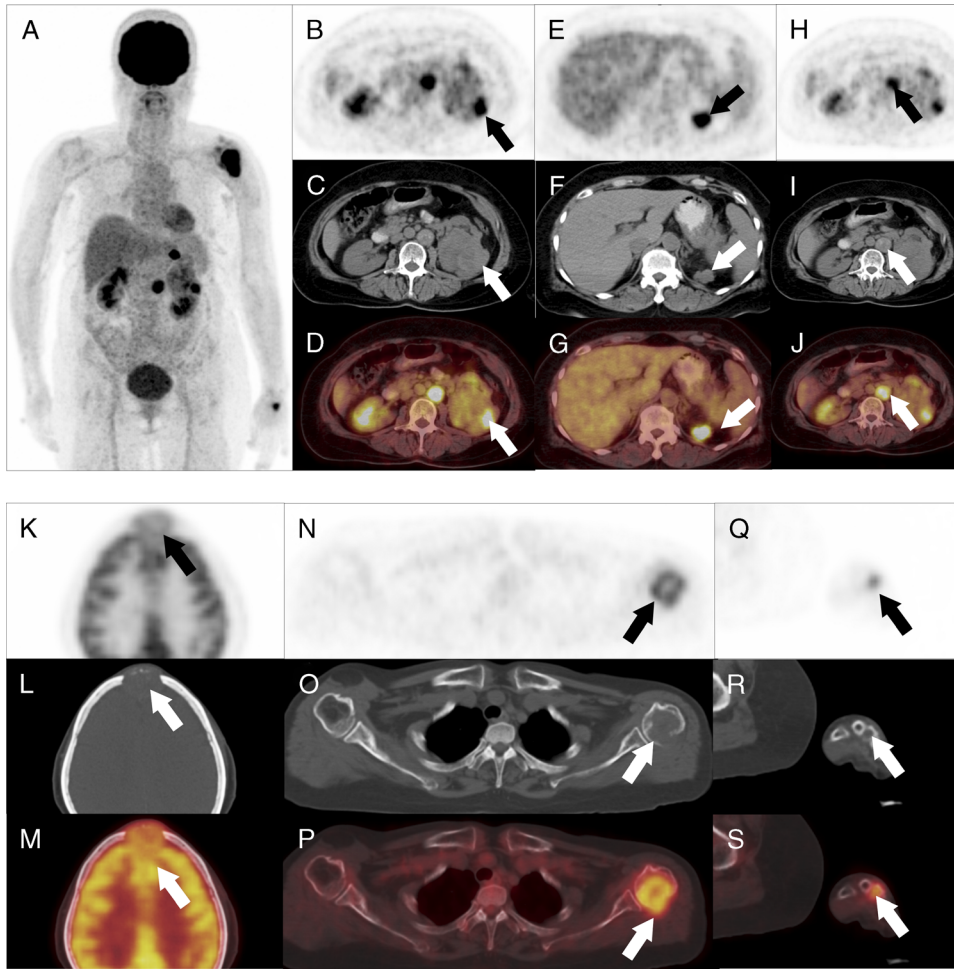

FIGURE 1. A 67-year-old woman, with no known medical illness, presented with left shoulder pain for 5 months. Initial shoulder x-ray (not shown) showed lytic lesion at left proximal humerus. She was referred for ^{18}F-FDG PET/CT for unknown primary evaluation. **A**, PET/CT was obtained at 45 minutes after 194 MBq of ^{18}F-FDG was administered. Scan findings revealed FDG hypermetabolism in the soft tissue mass at the mid-pole of left kidney (SUV_{max}, 7.97; **B–D**), left suprarenal nodules (SUV_{max}, 10.77; **E–G**), enlarged para-aortic node (SUV_{max}, 8.45; **H–J**), and multiple bone lytic lesions including frontal bone (SUV_{max}, 7.54; **K–M**), left humeral head (SUV_{max}, 10.53; **N–P**), and the left metacarpal bone (SUV_{max}, 6.82; **Q–S**).

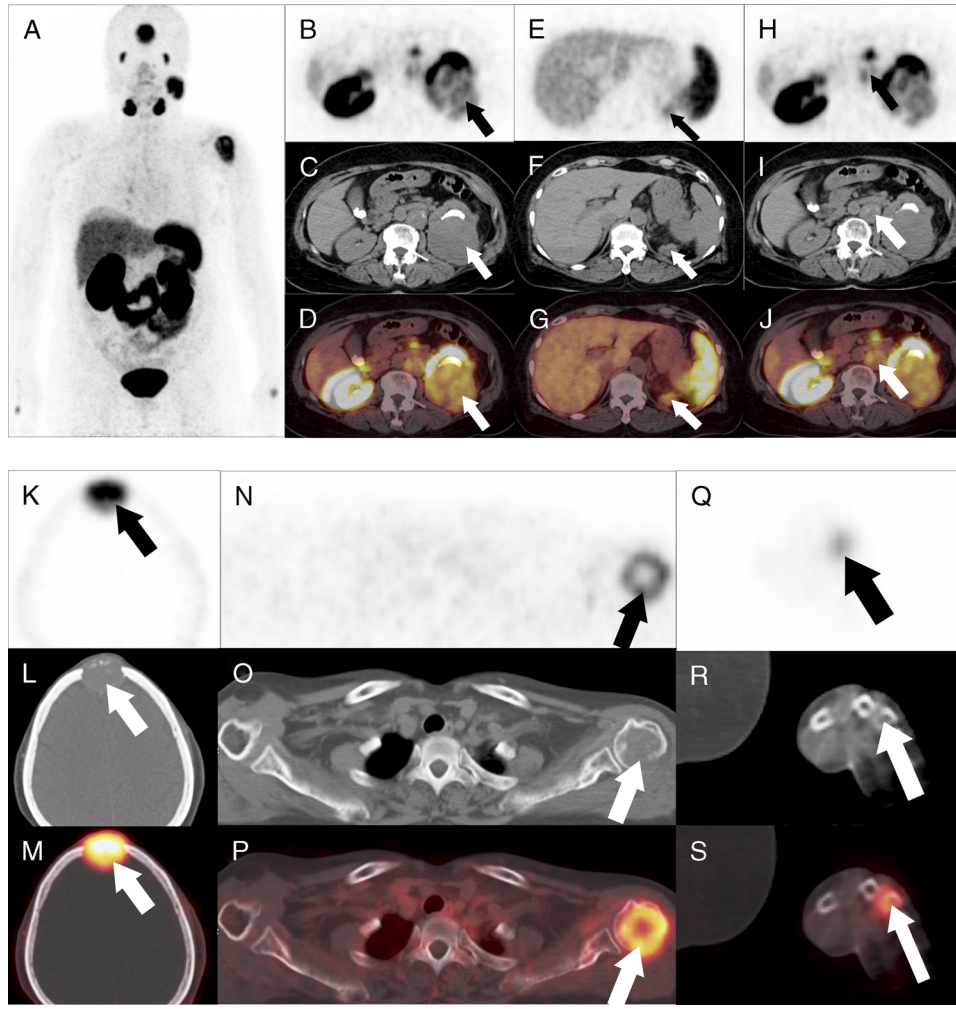

FIGURE 2. Two days later, she was reevaluated with ^{68}Ga-PSMA PET/CT. **A**, After IV administration of 140 MBq of ^{68}Ga-PSMA, PET/CT images were acquired at 45 minutes. ^{68}Ga-PSMA PET/CT demonstrated concordant uptake at the left kidney mass (SUV_{max}, 13.13; **B–D**), left suprarenal nodule (SUV_{max}, 8.82; **E–G**), enlarged para-aortic node (SUV_{max}, 9.06; **H–J**), and similar bone lytic lesions including frontal bone (SUV_{max}, 18.03; **K–M**), left humeral head (SUV_{max}, 13.82; **N–P**), and left metacarpal bone (SUV_{max}, 5.38; **Q–S**). Subsequent excision biopsy over the left humeral lesion revealed renal cell carcinoma (RCC) with clear cell types. RCC accounts for about 80% of all kidney cancers.[1] Recent studies have demonstrated that PSMA is expressed by the nonprostatic tumor-associated neovasculatures including RCC, but not in benign tissue vasculature epithelium.[2,3] Suspected left renal cell carcinoma was initially detected by ^{18}F-FDG PET/CT in this patient presented with initial bone lesion.[4] As recent case reports and series have demonstrated the usefulness of ^{68}Ga/^{18}F-PSMA in restaging recurrent renal cancer after nephrectomy,[5,6] we explore the potential utility of ^{68}Ga-PSMA PET/CT in characterizing and staging renal cell mass. In this case, despite high tracer activity in the kidney, the SUV_{max} of the primary RCC correlates well to the metastatic sites. Furthermore, this case also demonstrates unusual acrometastasis to the left metacarpal bone.[7] As previous studies have demonstrated variable diagnostic performance of ^{18}F-FDG PET/CT in diagnosing RCC,[8] this case suggests that ^{68}Ga-PSMA PET/CT may be a potential radiotracer in characterizing and staging renal cell carcinoma, in particular, clear cell subtypes. Further prospective study is recommended.