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Letter to Editor

Comparison of FDG and Ga-68 PSMA PET/CT Findings in a Case of Metastatic Hepatocellular Carcinoma

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To The Editor

Prostate-specific membrane antigen (PSMA) is a transmembrane protein secreted from the prostate epithelium. Ga-68 PSMA positron emission tomography/computed tomography (PET/CT) is a widely used imaging method for the visualisation of prostate cancer (1-3). PSMA expression has also been reported for some non-prostate malignancies including hepatocellular cancers (4,5). Demonstration of PSMA uptake in non-prostate malignancies may constitute an alternative for targeted therapies with 177 Lu-PSMA. Therefore, the use of PSMA-targeted imaging and therapy is expected to increase dramatically in the coming years (6,7). Hepatocellular carcinoma (HCC) is a primary malignant liver tumor originating from hepatocytes, more prevalent in populations with a high incidence of viral hepatitis, with approximately 80% developing on the background of chronic hepatitis B and C infections. It is the fifth most common cancer worldwide. The diagnosis of hepatocellular carcinoma includes imaging methods, biomarkers, and biopsy (1). Imaging techniques include ultrasonography, CT, and magnetic resonance imaging. Alpha-fetoprotein is examined as a biomarker (1). Biopsy is employed when a diagnosis cannot be made despite all other tests. It has been reported that 95% of HCC cases show PSMA uptake due to tumor neovascularization, and imaging with 68Ga-PSMA has been found to detect more cases compared to FDG (9), 18F-choline, and contrast-enhanced CT, especially in areas where FDG uptake is lower, indicating higher PSMA uptake (8-10). In this case study, we aimed to share the findings of a patient diagnosed with HCC who underwent whole body F-18 fluorodeoxyglucose (FDG) PET/CT imaging and Ga-68 PSMA PET/CT imaging and its contribution to diagnosis and staging. PSMA is involved in many malignancies such as glial, renal, lung, colorectal and hepatocellular cancers due to its tumor neovascularization properties.

Case: A 70-year-old male patient diagnosed with hepatocellular carcinoma (HCC) underwent FDG PET/CT imaging for initial staging (**Figure 1**). The imaging revealed an irregularly bordered mass approximately 199x151 mm in size at the level of liver segments 7-8-4-5 with a maximum SUV (SUVmax) of 5.9. In addition

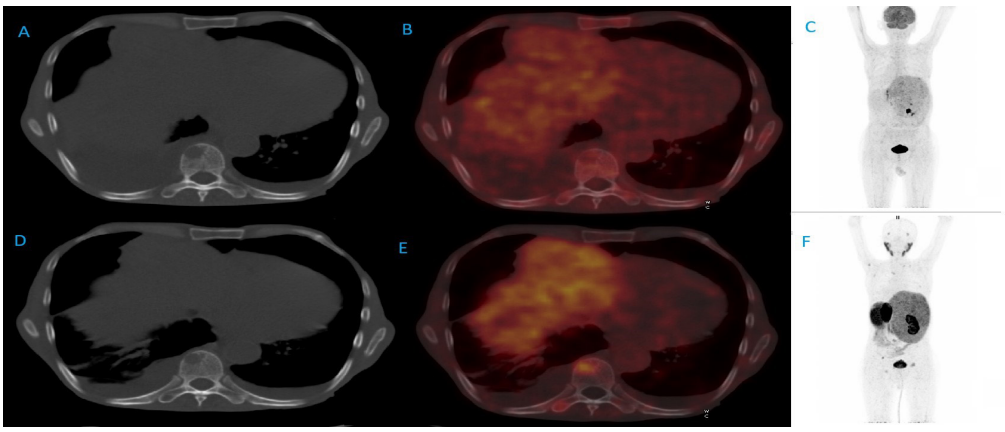

Figure 1. BFigure 1. Axial tomography image (A), axial positron emission tomography/computed tomography image (B), MIP image (C) in FDG PET/CT study and axial tomography image (D), axial positron emission tomography/computed tomography image (E), MIP image (F) in Ga-68 PSMA PET/CT study of lesions observed in T9 vertebral corpus and right transverse process of a patient with HCC.

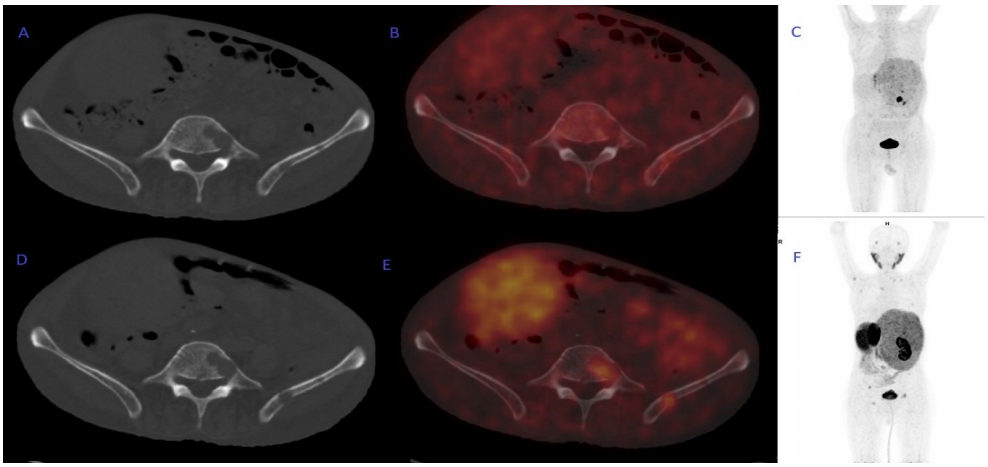

Figure 2. Lesions observed in the L5 vertebral body and left iliac bone of a patient diagnosed with HCC on FDG PET/CT study; axial tomography image (A), axial positron emission tomography/computerized tomography image (B), MIP image (C), and in the Ga-68 PSMA PET/CT study; axial tomography image (D), axial positron emission tomography/computerized tomography image (E), MIP image (F).of a patient with HCC.

to this lesion, multiple irregularly bordered masses and nodular lesions were observed in both lobes, with the largest being about 67 mm in diameter at the level of liver segment 6, where the SUVmax was 3.8. No pathological FDG uptake was observed in the widespread lytic lesions in the skeletal system seen on CT. In the differential diagnosis of mass lesions and bone metastases, Ga68 PSMA PET/CT imaging was conducted (**Figure 2**). It revealed increased PSMA uptake with an SUVmax of 6.9 in the irregularly bordered mass of approximately 199x151 mm at the level of liver segments 7-8-4-5. Besides this lesion, increased PSMA uptake with an SUVmax of 7.3 was found in multiple irregularly bordered masses and nodular lesions observed in both lobes, with the largest about 67 mm in diameter at the level of liver segment 6. Furthermore, in the skeletal system, significantly increased PSMA uptakes were detected with an SUVmax of 5.3 in the widespread lytic lesions. The role of F-18 FDG PET/CT imaging is generally limited in HCC cases due to the tumor's low metabolism. Ga-68 PSMA PET/CT is a current method used in prostate cancer imaging. However, increased PSMA expression has also been found in many non-prostate malignancies, including HCC. In our case, the PSMA uptake in the lytic lesions of the skeletal system was significantly higher than the FDG uptake.

In conclusion, Ga-68 PSMA PET/CT imaging can be used in many non-prostate related malignancies. We perform Ga68 PSMA PET-CT imaging to contribute to diagnosis and staging in patients who have undergone FDG PET-CT but do not show uptake. In this case, we can say that Ga-68 PSMA PET/CT was useful and superior in the detection of bone metastases in addition to the primary tumour. When evaluated on a case basis, it can be considered that tumours and metastases detected with PSMA may also be useful in the use of targeted therapies.

DECLARATIONS

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