False-negative ^{18}F-PSMA-1007 PET/CT in metastatic prostate cancer related to high physiologic liver uptake

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A 71-year-old man with advanced castration-resistant prostate cancer was referred to our department for evaluation of prostate-specific membrane antigen (PSMA)–directed radioligand therapy (RLT). After initial diagnosis of prostate cancer (pT3a, GIIIa, Gleason Score 9), the patient had undergone multiple therapies including androgen deprivation, abiraterone, enzalutamide, radiotherapy, and chemotherapy with docetaxel and currently demonstrated disease progression. Pre-therapeutic PSMA-PET/CT with ^{18}F-PSMA-1007 (Figure a and b; imaging performed at 2 h p.i.) showed multiple bone metastases and no lymphatic or abdominal lesions. In order to rule out PSMA-negative disease, ^{18}F-FDG-PET CT (Figure c) was additionally performed [1, 2], demonstrating two FDG-avid liver lesions highly suspicious for hepatic metastases without corresponding ^{18}F-PSMA-1007 uptake (Figure c red arrows; axial slices: Figure e and f).

The patient refused alternative chemotherapy with cabazitaxel and the first cycle of RLT was performed with 6.2 GBq ^{177}Lu-PSMA I & T. Post-therapeutic whole-body scintigraphy at 24 h p.i. confirmed strong radionuclide accumulation in the osseous tumour manifestations (Figure d). Of note, the FDG-positive liver metastases also showed moderate to intense uptake of the radioligand (Figure d; black arrows). Prior to the second cycle of RLT serum, PSA levels rose from 18 to 65 ng/ml.

Whereas F-18 labelled PSMA ligands such as ^{18}F-PSMA1007 perform at least comparably to Ga-68 labelled compounds and feature advantages in the detection of local recurrence due to reduced urinary clearance [3], high hepatobiliary tracer uptake might impair the detection of liver or visceral metastases. Given the fact that presence of hepatic disease is associated with a poor prognosis [4] and that PSMA-negative disease should be ruled out prior to RLT [5], assessment of liver metastasis might pose a new challenge.

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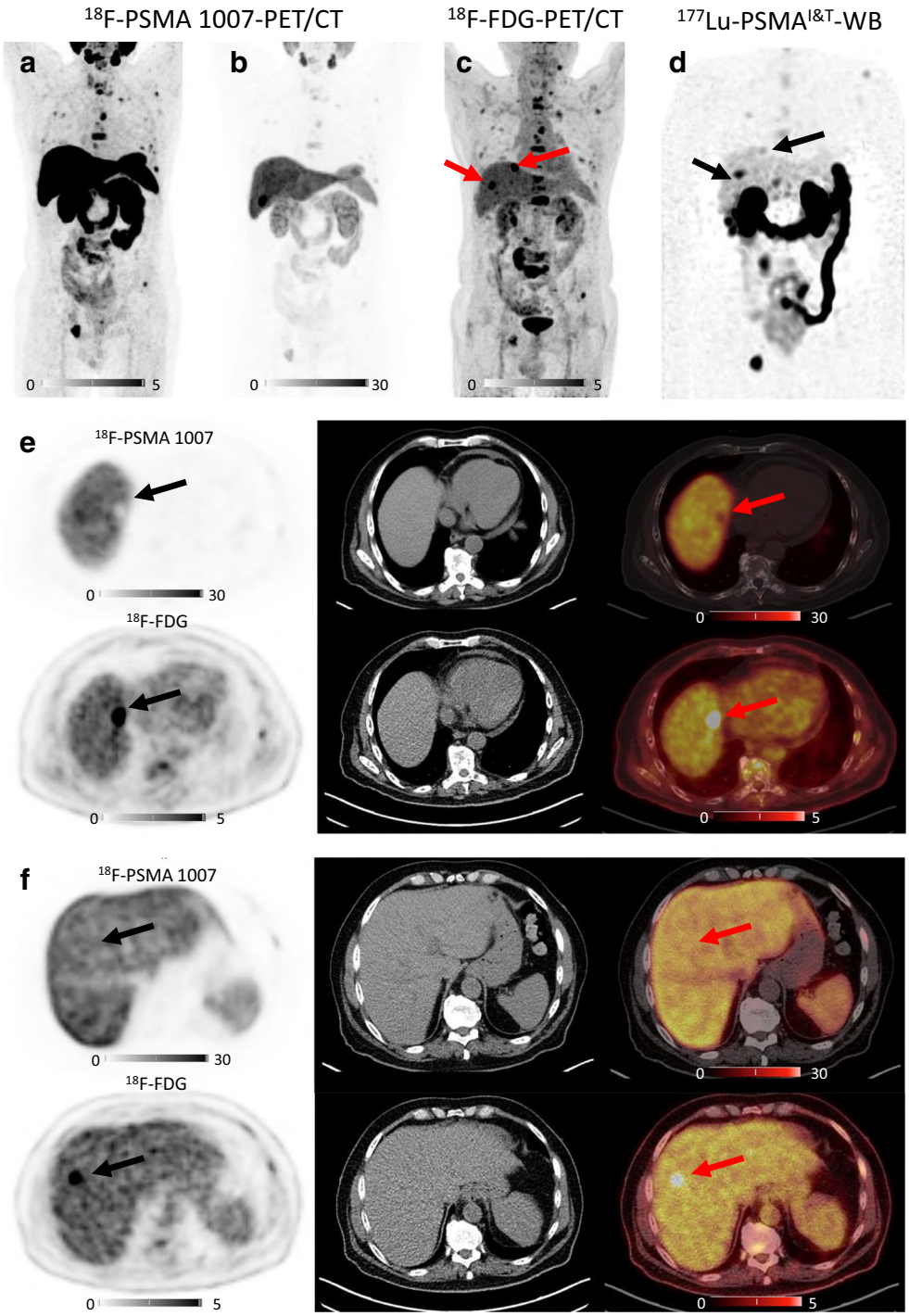

Compliance with ethical standards

Informed consent from the patient for publication of this case study was obtained.

Conflict of interest The authors declare that they have no conflict of interest.

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