

Interesting Images

Head-to-Head ^{18}F -rhPSMA-7.3 and ^{18}F -PSMA-1007 PET/CT in Recurrent Prostate Cancer: Pulmonary and Nodal Uptake as a Diagnostic Challenge

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Abstract

This report presents a within-patient comparison of ^{18}F -rhPSMA-7.3 and ^{18}F -PSMA-1007 PET/CT in a 71-year-old man with Gleason score $4 + 3 = 7$, pT3bN1 metastatic castration-resistant prostate cancer after robot-assisted radical prostatectomy, multiple androgen-deprivation and androgen receptor-directed treatments, and radiotherapy for para-aortic nodal metastases. The scans showed concordant PSMA-avid cervical-to-mediastinal lymphadenopathy and an ill-defined right lower-lobe pulmonary lesion with a recorded SUVmax > 15 , despite distinct physiologic biodistributions. Infection or inflammation remained a relevant differential diagnosis, and the patient declined biopsy. Antibiotics did not improve the CT findings. After enrollment in a clinical trial of systemic therapy, the last available pretreatment prostate-specific antigen (PSA) level of 42.4 ng/mL decreased to 3.1 ng/mL, with marked disease regression. The concordant dual-tracer findings, lack of response to antibiotics, and subsequent radiographic and biochemical response to systemic therapy favored nodal and pulmonary metastases from prostate cancer. However, without histopathologic confirmation, the diagnosis remains presumptive, highlighting the need to integrate PET biodistribution, semiquantitative uptake, anatomic imaging, and longitudinal clinical findings.

Keywords: PSMA PET; metastatic carcinomatosis; mCRPC; prostate cancer



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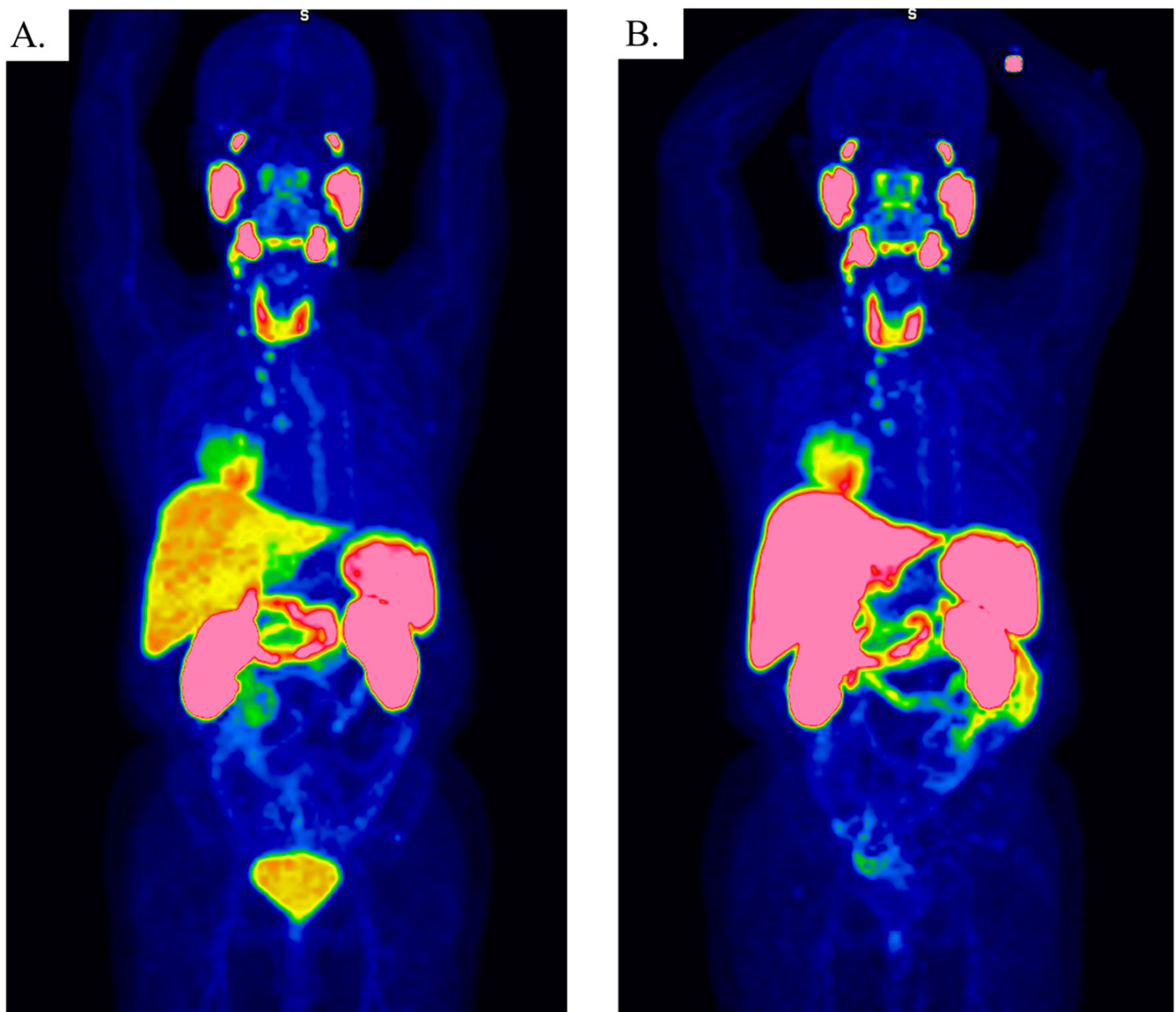


Figure 1. Anterior maximum-intensity-projection (MIP) PET/CT images of a 71-year-old man with Gleason score $4 + 3 = 7$, pT3bN1 prostate adenocarcinoma and metastatic castration-resistant disease after robot-assisted radical prostatectomy. Prior treatment included leuprorelin (from December 2014 to February 2020), bicalutamide (Casodex; March 2020), degarelix (from April to October 2020), radiotherapy for para-aortic nodal metastases (completed on 7 August 2020), triptorelin (Diphereline; from November 2020 to March 2021), leuprorelin (from April 2021 to March 2024), apalutamide (from 21 October 2021), and leuprolide acetate (Eligard; from June 2024). Because of a continued rise in serum PSA, the patient underwent further evaluation with ^{18}F -rhPSMA-7.3 PET/CT ((A); 7 May 2025) and ^{18}F -PSMA-1007 PET/CT ((B); 23 June 2025). The two examinations were performed 47 days apart before the initiation of protocol-directed therapy in a clinical trial. Image acquisition for both PET/CT examinations began approximately 60 min after intravenous administration of the respective tracer. ^{18}F -rhPSMA-7.3 showed higher urinary bladder activity and minimal hepatobiliary uptake, whereas ^{18}F -PSMA-1007 showed intense hepatic and gallbladder activity.

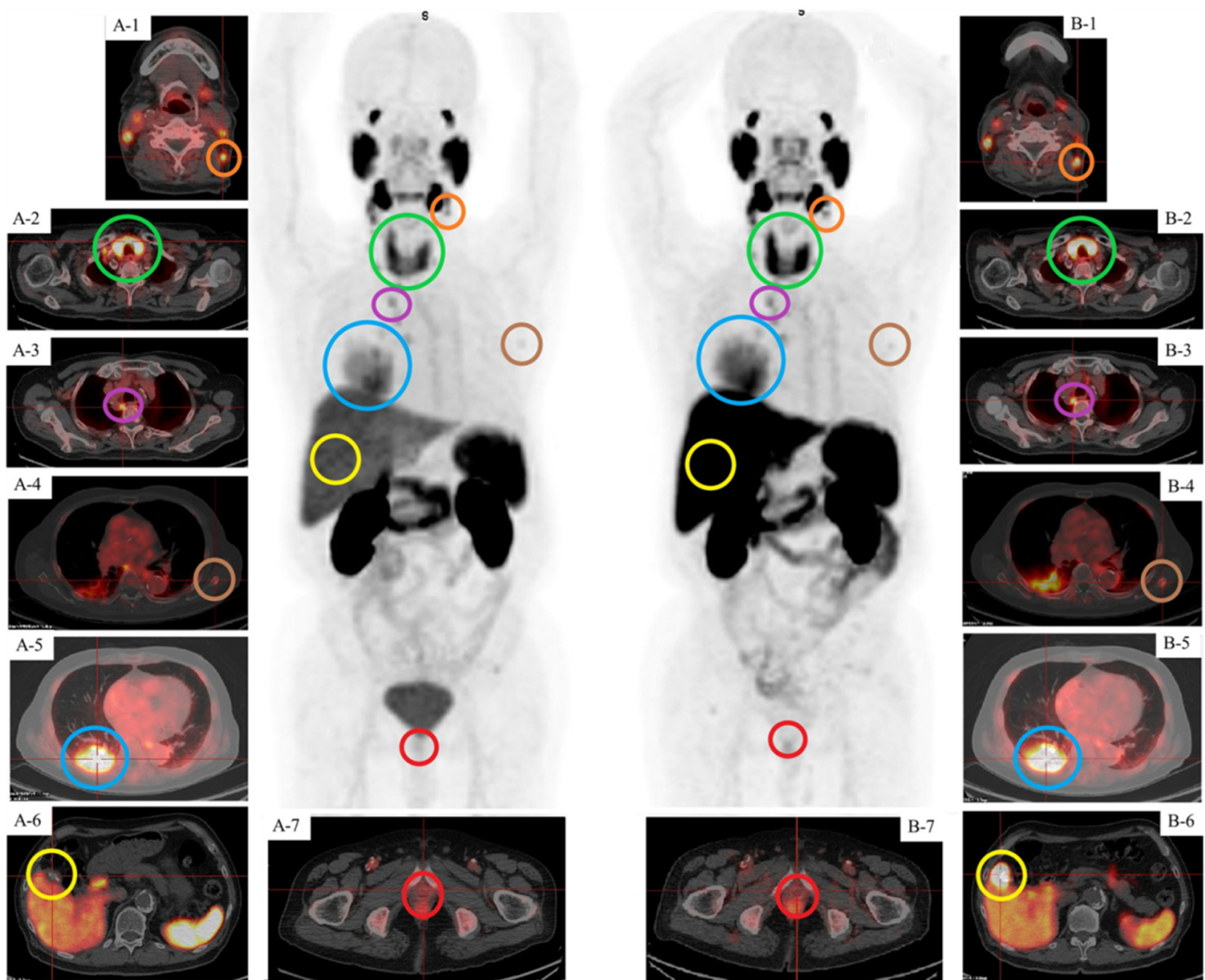


Figure 2. Within-patient ^{18}F -rhPSMA-7.3 and ^{18}F -PSMA-1007 PET/CT comparison shows concordant PSMA-avid cervical and mediastinal lymph nodes and a right lower-lobe pulmonary lesion. Circled areas indicate neck lymphadenopathy (A-1,B-1), diffuse thyroid uptake (A-2,B-2), right paratracheal lymphadenopathy (A-3,B-3), a nonspecific left scapular focus (A-4,B-4), the pulmonary lesion (A-5,B-5), gallbladder activity (A-6,B-6), and the prostate bed (A-7,B-7), illustrating distinct physiologic distributions. The ill-defined, patchy centrilobular pulmonary opacity was a potential PSMA PET pitfall because inflammatory neovascularization and activated macrophages can show PSMA uptake [1,2]. The pulmonary lesion showed intense uptake, with a recorded SUVmax > 15, while the lymphadenopathy demonstrated an SUVmax of 7.0. Because the two examinations used different PSMA tracers and complete lesion-level SUVmax values were unavailable, a direct quantitative comparison was not considered appropriate; the comparison was therefore limited to qualitative assessment of lesion concordance, distribution, and uptake intensity. Concordant findings across two ligands, extensive nodal involvement, and a lymphangitic pulmonary pattern raised concern for metastatic disease but were not pathognomonic.

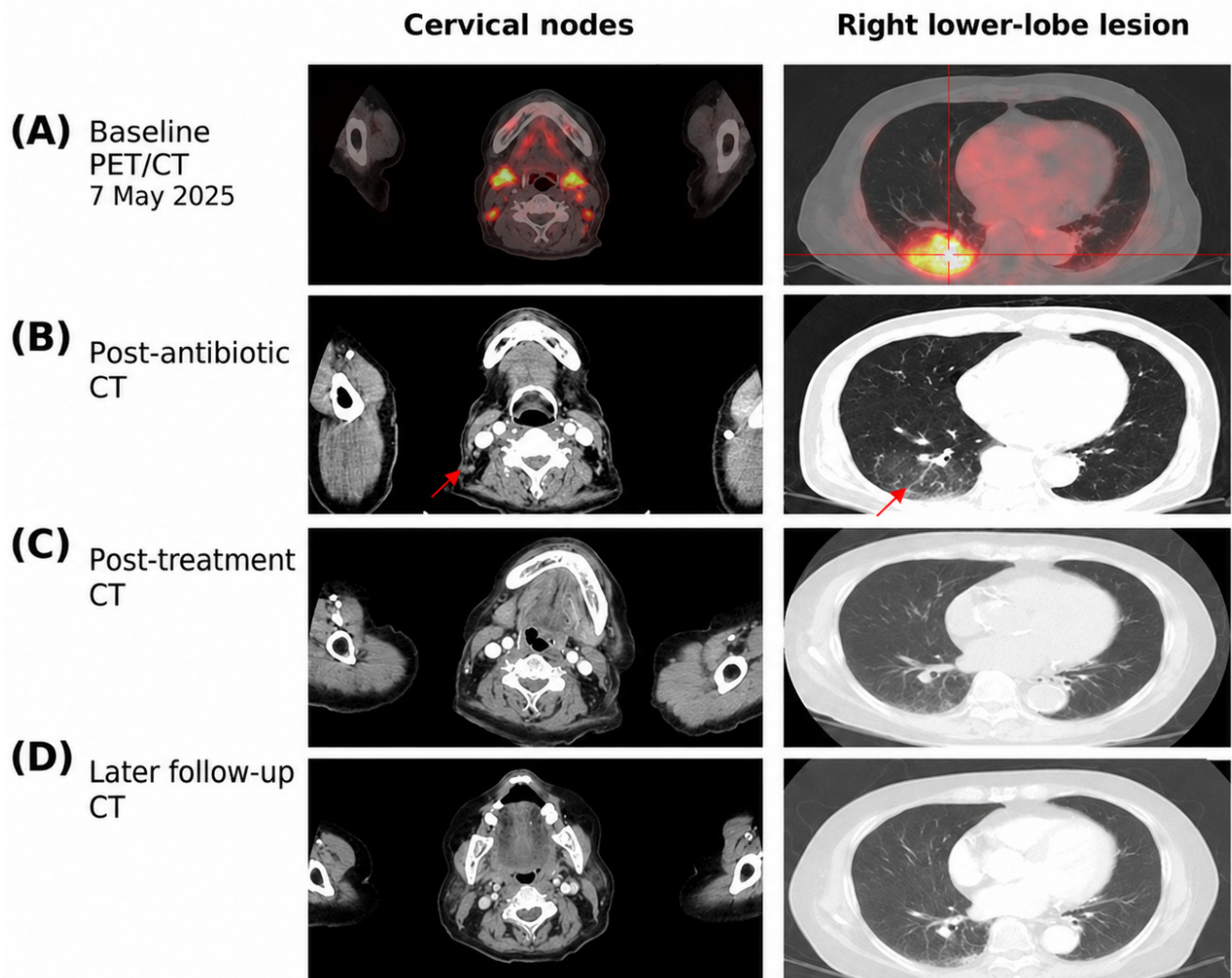


Figure 3. Longitudinal imaging response. Baseline ^{18}F -rhPSMA-7.3 PET/CT showed PSMA-avid bilateral cervical lymphadenopathy and an ill-defined right lower-lobe pulmonary lesion ((A); red cross), raising differential considerations of metastatic prostate cancer and infection or inflammation. Initially, infection with reactive lymph nodes was suspected despite the rarity of diffuse pulmonary metastases from prostate cancer [3], and antibiotics were then administered. The first follow-up CT showed persistent cervical nodes and pulmonary abnormality ((B); arrows). The patient declined biopsy and entered a clinical trial of systemic therapy targeting androgen signaling in August 2025; the investigational agent is not disclosed owing to trial confidentiality. Subsequent CT showed marked regression of the cervical lymphadenopathy and pulmonary lesion (C), with further near-complete resolution on later follow-up (D). The last available pretreatment PSA was 42.4 ng/mL after serial increases from 10.0 to 19.9 and 25.6 ng/mL; after treatment, PSA decreased to 3.1 ng/mL. The combined radiologic and biochemical response supported a working diagnosis of metastatic nodal disease with pulmonary lymphangitic involvement. However, in the absence of histopathologic confirmation, the diagnosis remains presumptive, underscoring the need to integrate tracer biodistribution, lesion uptake intensity, anatomic imaging findings, and the longitudinal clinical course [4,5].

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Data Availability Statement: The original contribution presented in this study is included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: Author Ya-Ting Huang was employed by the company Primo Biotechnology Co., Ltd. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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