Incidental Detection of Lung Adenocarcinoma Presenting as an Anterior Mediastinal Mass on F-18-Fluciclovine PET/CT in a Patient With Primary Prostate Cancer

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Incidental detection of lung adenocarcinoma presenting as an anterior mediastinal mass on $^{18}$F-fluciclovine PET/CT in a patient with primary prostate cancer.

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Abstract

$^{18}$F-fluciclovine is a positron emission tomography (PET) radiotracer approved for detection of recurrent prostate cancer, with utility in other malignancies being investigated. We present a case of a 71-year-old man with high-risk primary prostate cancer (Gleason score 9; prostate-specific antigen 34 ng/ml) and newly diagnosed lung adenocarcinoma. As part of a clinical trial (NCT03081884), preoperative $^{18}$F-fluciclovine PET/CT showed localized abnormal uptake in the prostate gland with extracapsular extension. Additionally, an incidental anterior mediastinal mass measuring 2.2×1.8 cm demonstrated abnormal radiotracer uptake. Biopsy of the mediastinal mass confirmed invasive lung adenocarcinoma with solid and acinar patterns, and high PD-L1 expression.

Keywords

$^{18}$F-fluciclovine; Axumin; $^{18}$F-FDG; lung adenocarcinoma; prostate cancer; PET

$^{18}$F-fluciclovine is an amino acid analog PET radiotracer approved for detection of post-treatment prostate cancer recurrence.3–7 L-type amino acid transporter 1 (LAT1) and alanine-serine-cysteine transporter 2 (ASCT2) mediate the uptake of $^{18}$F-fluciclovine and are overexpressed in malignant cells including prostate and non-small cell lung cancers (NSCLC).8–12 Our findings agree with other reports on the ability of $^{18}$F-fluciclovine PET/CT to detect NSCLC.13, 14 A previous study from this center reported the potential of $^{18}$F-fluciclovine PET/CT to identify primary lung cancer, with higher radiotracer uptake in squamous cell carcinoma.13 Similar to prior reports, $^{18}$F-FDG uptake in the anterior...
mediastinal mass was greater than with $^{18}$F-fluciclovine, but $^{18}$F-FDG had less metabolic activity in the prostate compared to $^{18}$F-fluciclovine. Our case highlights lung adenocarcinoma presenting as an anterior mediastinal mass with incidental uptake of $^{18}$F-fluciclovine. As in this case, patients with an unusual lesion pattern for prostate cancer should undergo further evaluation for other primary tumors.

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**References**


FIGURE 1:
A 71-year-old man current smoker (50 pack-years) with biopsy-proven high-risk primary prostate cancer (cT1c, Gleason 9, serum prostate-specific antigen 34.0 ng/ml) and presumed localized disease on conventional imaging underwent preoperative $^{18}$F-fluciclovine (Axumin®; Blue Earth Diagnostics, Ltd, Oxford UK) PET/CT as part of a clinical trial. Whole body PET images were acquired after intravenous bolus injection of 10.0 mCi (370 MBq) $^{18}$F-fluciclovine. Maximum intensity projection (MIP) (A, long black arrow), axial CT (B), PET (C), and fused PET/CT (D) images demonstrate a well-defined focus of intense $^{18}$F-fluciclovine uptake in the right mid-apex prostate gland (maximum standardized uptake value [SUVmax] 6.7) with possible extracapsular extension, consistent with prostate cancer. There was no evidence of nodal or osseous metastases. Additionally, a $^{18}$F-fluciclovine-avid anterior mediastinal mass measuring 2.2×1.8 cm was identified on MIP (A, short black arrow), axial and sagittal CT (E, H), PET (F, I; SUVmax 5.9), and fused PET/CT (G, J). Further evaluation of the anterior mediastinal mass was recommended.
Figure 2:
Patient underwent contrast-enhanced CT and thoracoscopic biopsy seven months after $^{18}$F-fluciclovine PET/CT (delay due to patient’s socioeconomic challenges). Pathology confirmed invasive lung adenocarcinoma with solid and acinar patterns shown in the 200× histology image of the H&E sections (A) with high PD-L1 expression that indicates good prognosis. Immunohistochemistry showed positivity for TTF1 (B) and napsin A (C) while being NKX3.1 negative (D).
FIGURE 3:
Subsequent $^{18}$F-fluorodeoxyglucose ($^{18}$F-FDG) PET/CT was obtained for lung adenocarcinoma staging. PET images were acquired 60–90 minutes after intravenous injection of 10.1 mCi (373.7 MBq) $^{18}$F-FDG. MIP (A, short black arrow), axial and sagittal CT (E, H), PET (F, I; SUVmax 17.7) and fused PET/CT (G, J) demonstrate significant hypermetabolism focus involving a right anterior mediastinal mass with interval increase in size (2.9×2.2 cm), superior vena cava and chest wall invasion, corresponding to lung adenocarcinoma confirmed on histology. Additionally, MIP (A, long black arrow), axial CT (B), PET (C), and fused PET/CT (D) show nonspecific heterogeneous $^{18}$F-FDG activity within the prostate gland. No findings suggestive of thoracic adenopathy or distant metastatic disease. Patient is currently receiving fractionated radiotherapy and systemic therapy (carboplatin+paclitaxel).