Case Report: Pulmonary Actinomycosis Infection Mimes Lung Cancer on $[{\textsuperscript{68}}\text{Ga}]\text{Ga-FAPI PET/CT}$

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Actinomycosis is a rare gram-positive infection, generally granulomatous. The diagnosis can be complex and sometimes can be achieved only at the chronic stage. Actinomyces normally colonize the mouth, urogenital tract, and gastrointestinal tract, whereas pulmonary infections occur primarily as a complication of secretion aspiration ($I$).

A 70-y-old patient who had undergone previous surgery for prostate cancer, was a former smoker, and had a family history of lung cancer presented with hemoptysis. A thoracic high-resolution CT scan detected a 45-mm heterogeneous pulmonary nodule (with surrounding ground-glass opacification) in the inferior right lobe, suggestive of malignancy and no significant adenopathies. Subsequent $[{\text{18}}\text{F}]\text{FDG PET/CT}$ showed significant uptake in the nodule, with SUV$\text{max}$ of 12.7 (Fig. 1A). For the suspected lung cancer, the patient was then enrolled in a prospective monocentric interventional study (EudraCT number 2021-006570-23 [CE AVEC: 51/2022/Farm/AOUBo]); the study protocol was approved by a Committee on Ethics, and all subjects signed a written informed-consent form.

The patient underwent $[{\text{68}}\text{Ga}]\text{Ga-FAPI}$ PET/CT 23 d later. The images showed only mild uptake (SUV$\text{max}$ 5.9 at 60 min after injection; Fig. 1B) in the pulmonary nodule, slightly increasing on delayed scanning (SUV$\text{max}$ 8.9 at 160 min). No lymph node uptake was detected.

Bronchoscopy was performed, and the frozen-section procedure showed reactive bronchial cells with granulocyte infiltration and lymphocytes; however, the results of microbiology and biochemical blood testing were negative. Subsequent CT confirmed the lung finding, with necrotic center features, not responding to antibiotic therapy. One month after $[{\text{68}}\text{Ga}]\text{Ga-FAPI}$ PET/CT, the patient was hospitalized for recurrent hemoptysis, low hemoglobin level, and weight loss. After multidisciplinary evaluation, the patient was referred for right inferior lobectomy. The definitive histologic diagnosis excluded the presence of neoplastic cells; on the contrary, it showed acute bronchopneumonia and chronic abscess with gram-positive colonies, consistent with actinomyces. Immunohistochemistry was also performed (Figs. 1C and 1D with FAPI (53066; Abcam) and IRF-4–EP190 [Ventana; Roche]) double staining: FAPI antibody reacts with fibroblasts and plasma cells, whereas IRF-4 is a specific immunostain for plasma cells.

Although actinomycosis is well known to mimic lung cancer on $[{\text{18}}\text{F}]\text{FDG PET/CT}$ (2,3), this is a clear example of how the new tracer $[{\text{68}}\text{Ga}]\text{Ga-FAPI}$ can also be misleading in infection.

![Figure 1](image-url)