

⁶⁸Ga-FAPI PET/CT Unmasks Extensive Metastatic Invasive Lobular Breast Cancer when Conventional Imaging Falls Short

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Abstract

Invasive lobular carcinoma (ILC) is the second most common breast carcinoma, accounting for 10% to 15% of invasive breast carcinomas. ILC is more difficult to diagnose on breast imaging including mammography, ultrasound, and MRI. We report a case of 39-year-old female with newly diagnosed left breast ILC (ER+, PR+, HER2-). Mammography revealed a single irregular dense mass in the upper central quadrant. Conventional bone scintigraphy demonstrated no evidence of skeletal metastases. However, whole-body ⁶⁸Ga-FAPI PET/CT revealed a markedly different disease burden. This case highlights the added diagnostic value of ⁶⁸Ga-FAPI PET/CT in detecting the true extent of ILC, particularly when conventional imaging appears limited.

Keywords: Lobular breast cancer; ⁶⁸Ga-FAPI PET/CT; Fibroblast activation protein; cancer-associated fibroblasts; FAPI PET/CT; breast cancer

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Case Study

A 39-year-old female with invasive left breast lobular carcinoma (ILC) (ER+, PR+, HER2-) underwent mammography, which revealed a single irregular dense mass in the upper central quadrant measuring 2.4x2.8x3.5cm. Conventional bone

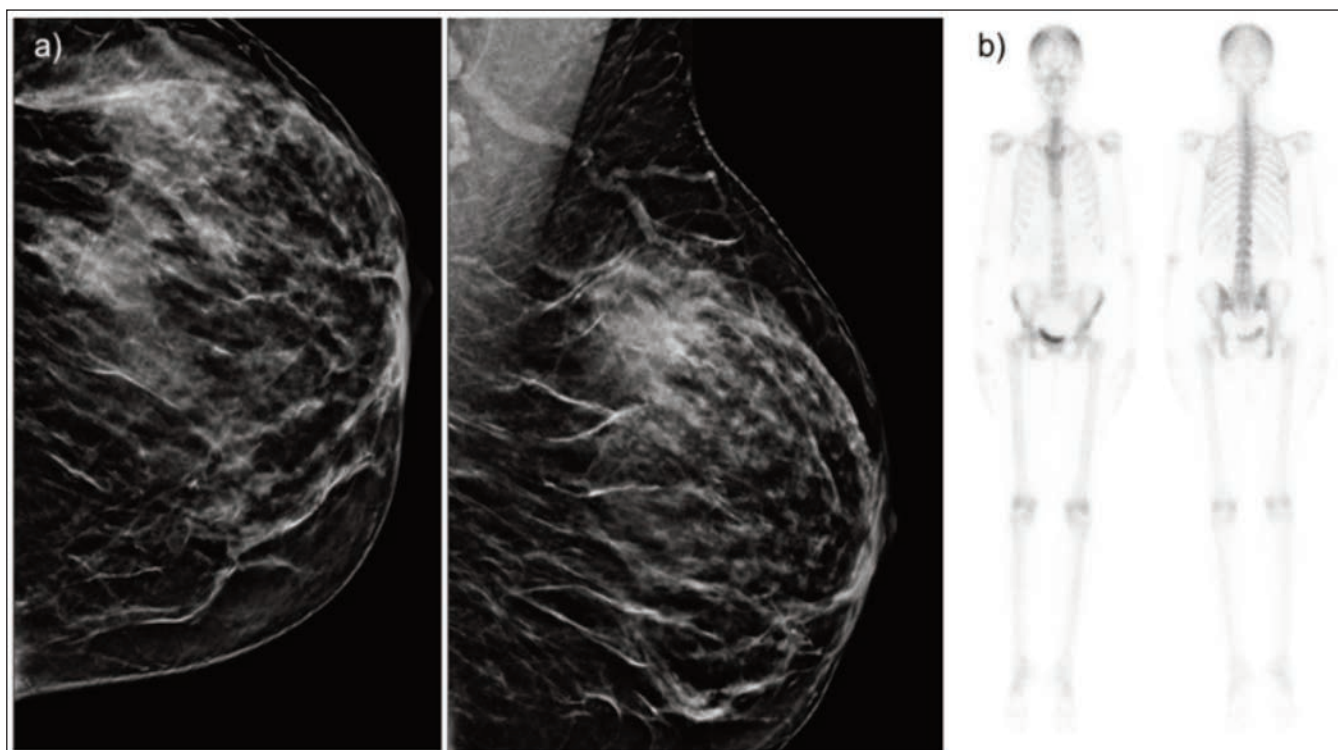


Figure-1: a) Mammography of the left breast shows an irregular, dense mass located in the upper central quadrant, approximately 5 cm from the nipple, measuring 2.4 × 2.8 × 3.5 cm. A focal asymmetry in the upper outer quadrant appears contiguous with the primary lesion, suggesting possible additional involvement. b) Whole-body ^{99m}Tc-MDP bone scintigraphy demonstrates no abnormal radiotracer uptake, with no evidence of skeletal metastases.

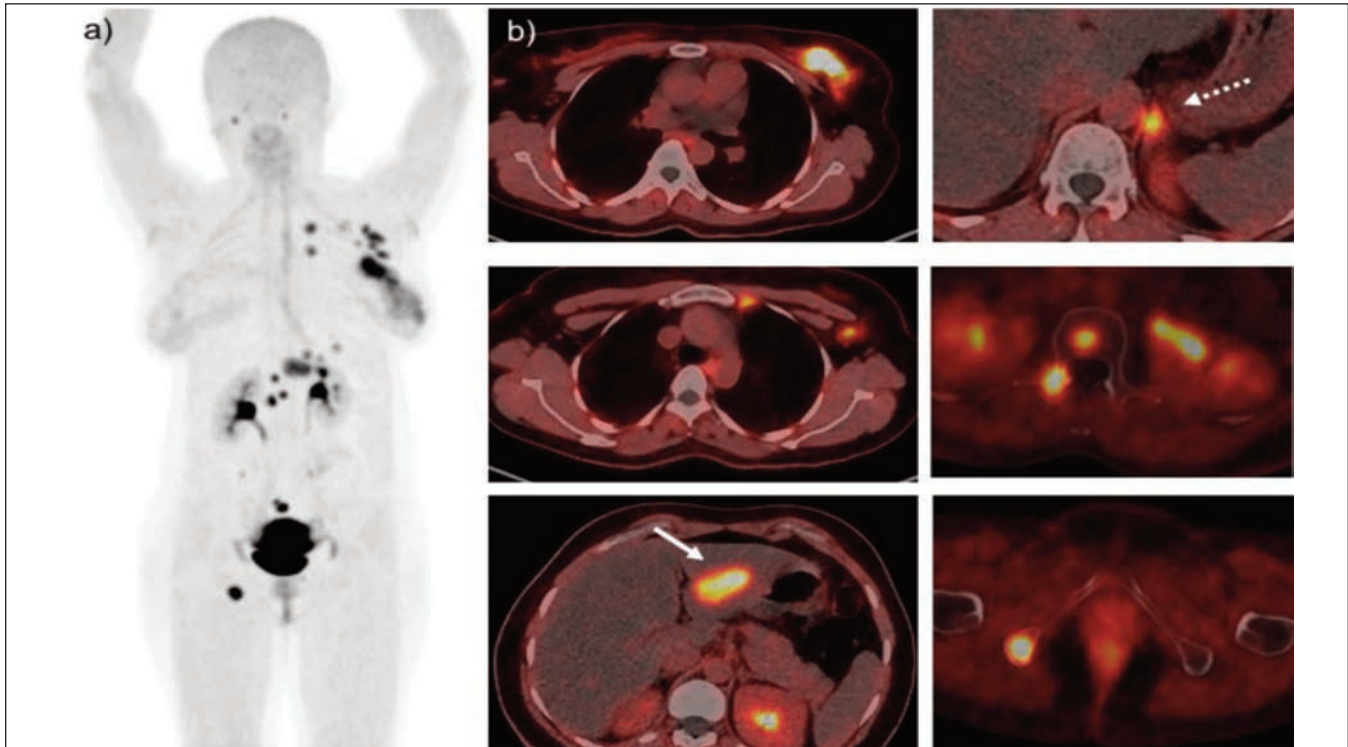


Figure-2: a-b) A large ^{68}Ga -FAPI-avid soft tissue mass is evident in the upper inner quadrant of the left breast (index lesion, SUVmax 11.0). Continuity of uptake extends across the lateral breast with heterogeneous increased tracer accumulation (SUVmax 8.6), reaching the nipple base, consistent with multicentric disease. Multiple avid left level I–III axillary and left internal mammary lymph nodes are noted. Additionally, distant metastatic deposits demonstrate intense ^{68}Ga -FAPI uptake in the liver (solid arrow), left adrenal gland (dotted arrow), and multiple skeletal sites.

scintigraphy demonstrated no evidence of skeletal metastases (Figure 1). However, ^{68}Ga -FAPI PET/CT revealed multicentric primary tumour involvement in the left breast with tracer-avid metastatic spread to ipsilateral level I–III axillary and internal mammary lymph nodes, as well as distant metastases to the liver, adrenal gland, and bones (Figure 2).

ILC is often characterized by subtle growth patterns, multifocality, and may be underestimated on conventional imaging.¹ Mammography frequently fails to capture the full extent of disease due to its infiltrative and low-density nature; bone scintigraphy may miss early skeletal involvement. Advanced molecular imaging techniques, particularly ^{68}Ga -FAPI PET/CT, have emerged as promising tools for enhanced tumour visualization by targeting fibroblast activation protein (FAP) overexpressed in the tumour microenvironment.^{2,3} In ILC, diffuse growth pattern, low glycolytic activity, and frequently subtle appearance on ^{18}F -FDG PET/CT, ^{68}Ga -FAPI PET/CT has an emerging role.⁴ By targeting FAP expressed in tumour stroma rather than relying on metabolic avidity, FAPI offers high tumour-to-background contrast, particularly in desmoplastic and infiltrative disease. Data show promising lesion conspicuity,

improved visualization of sclerotic bone metastases, peritoneal/serosal involvement, and small soft-tissue deposits that may be missed by ^{18}F -FDG.⁵ Although still preliminary, ^{68}Ga -FAPI PET/CT has the potential to fill diagnostic blind-spots in ILC by complementing ^{18}F -FDG PET and MRI for multimodality staging approach. Our case illustrates the superior diagnostic capability of ^{68}Ga -FAPI PET/CT for accurate staging which can influence treatment decisions and improve personalized patient management.

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