



# A Case with <sup>68</sup>Ga-FAPI Positive and <sup>18</sup>F-FDG Negative Breast Cancer

## <sup>68</sup>Ga-FAPI Pozitif, <sup>18</sup>F-FDG Negatif Meme Kanseri Olgusu

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### Abstract

A female patient diagnosed of infiltrative breast carcinoma using tru-cut biopsy underwent <sup>18</sup>fluorine-fluorodeoxyglucose (<sup>18</sup>F-FDG) positron emission tomography/computed tomography (PET/CT) for staging. The tumor was located in the superior external quadrant of the right breast, and did not exhibit pathological uptake in <sup>18</sup>F-FDG PET/CT. Later, gallium-68 (<sup>68</sup>Ga) fibroblast activation protein-specific inhibitor (FAPI)-04 PET/CT imaging was performed and the primary tumor showed intense radiotracer accumulation. This presumes that <sup>68</sup>Ga-FAPI PET/CT imaging is superior to <sup>18</sup>F-FDG imaging in detecting the primary tumor in breast cancer, thereby suggesting the replacement of FAPI by <sup>18</sup>F-FDG in breast-cancer staging in the future.

**Keywords:** <sup>68</sup>Ga-FAPI, <sup>18</sup>F-FDG, PET/CT, breast cancer

### Öz

Tru-cut biyopsi sonucu infiltratif meme karsinomu gelen bir kadın hastaya evreleme amacıyla <sup>18</sup>fluoride-florodeoksiglukoz (<sup>18</sup>F-FDG) pozitron emisyon tomografi/bilgisayarlı tomografi (PET/BT) görüntüleme yapıldı. Sağ meme üst dış kadranda yer alan tümör, <sup>18</sup>F-FDG PET/BT'de patolojik aktivite tutulumu göstermedi. Daha sonra hastaya galyum-68 (<sup>68</sup>Ga)-fibroblast aktivasyon protein spesifik inhibitör (FAPI)-04 PET/BT görüntüleme yapıldı ve primer tümör yoğun radyofarmasötik tutulumu gösterdi. Bu olgu <sup>68</sup>Ga-FAPI PET/BT görüntülemenin meme kanserinde primer tümörleri tespit etmede <sup>18</sup>F-FDG görüntülemeden üstün olabileceğini göstermiştir ve gelecekte meme kanseri evrelemesinde <sup>18</sup>F-FDG'nin yerini FAPI'nin alabileceğini düşündürmektedir.

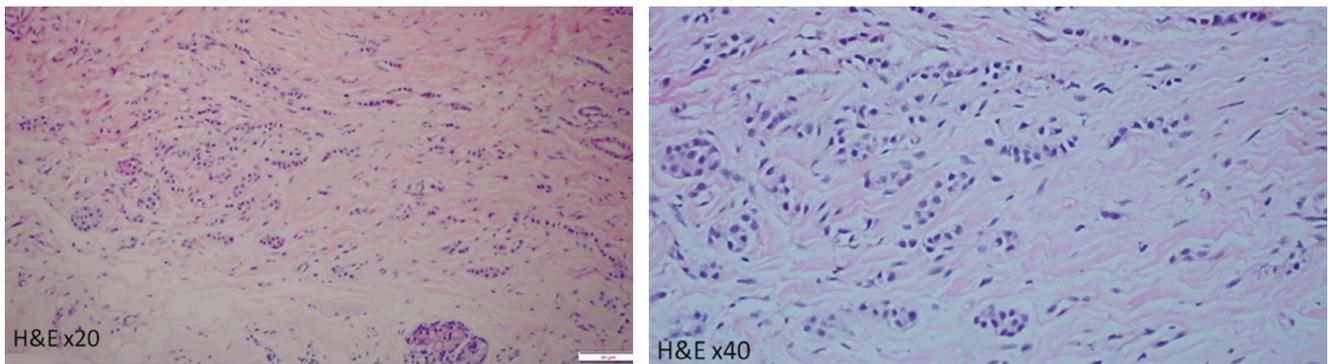
**Anahtar kelimeler:** <sup>68</sup>Ga-FAPI, <sup>18</sup>F-FDG, PET/BT, meme kanseri

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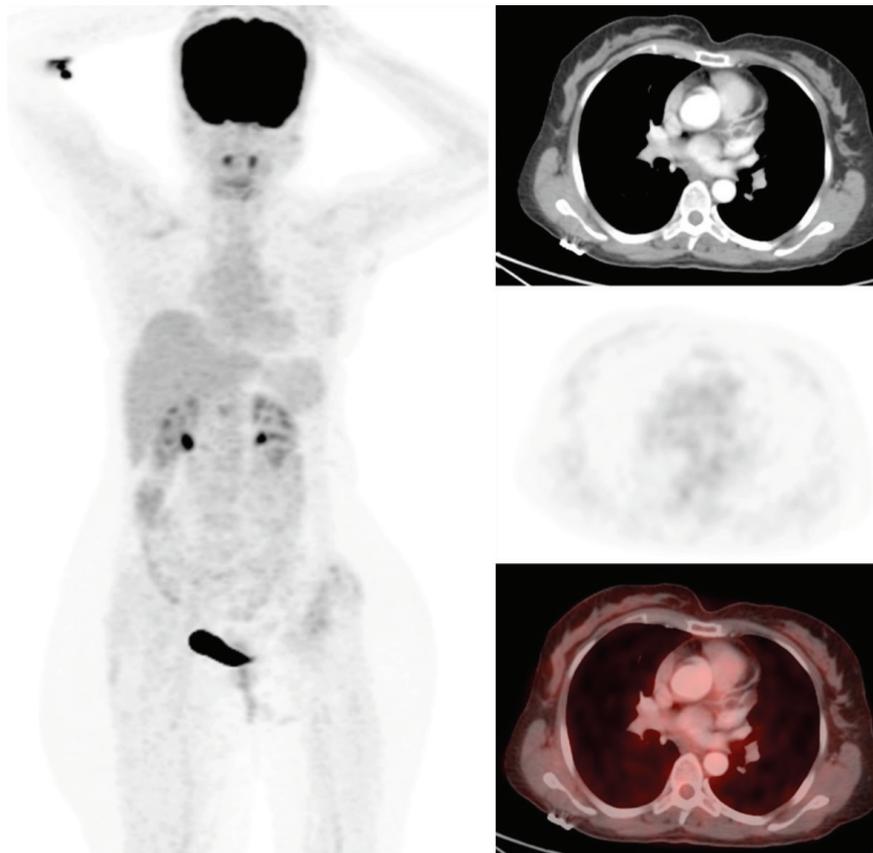
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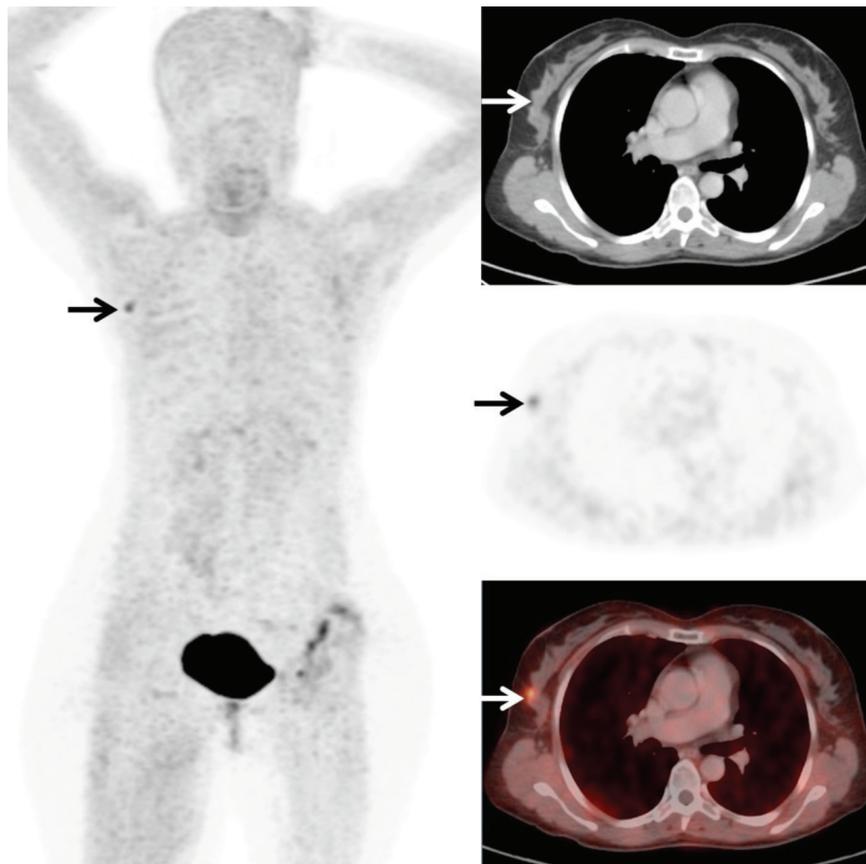
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**Figure 1.** A tru-cut biopsy performed on a 48-year-old woman, whose breast ultrasound revealed a Breast Imaging Reporting and Data System-4B lesion measuring 20×9 mm in the right breast at the 10 o'clock position. The histologic diagnosis was infiltrative breast carcinoma and tumor cells were in the form of single-cell infiltration in focal areas (hematoxylin and eosin ×20 and ×40) without myoepithelium in the collagenous stroma (estrogen receptor is strongly positive in 95% of the cells, progesterone moderately positive in 5% of the cells, and CerbB2 is negative).



**Figure 2.** <sup>18</sup>Flourine-fluorodeoxyglucose (<sup>18</sup>F-FDG) positron emission tomography/computed tomography (PET/CT) performed for breast-cancer staging. However, the primary tumor in the superior external quadrant of the right breast did not exhibit pathological uptake in the maximum intensity projection (MIP) and axial CT/PET-fusion images.



**Figure 3.** Gallium-68 ( $^{68}\text{Ga}$ )-fibroblast activation protein-specific inhibitor (FAPI)-04 PET/CT revealing intense radiotracer accumulation in the primary tumor distinguishing it from the MIP (a) image. The axial view of  $^{68}\text{Ga}$ -FAPI-04 PET/CT (CT, PET, and fusion images, respectively) demonstrated intense radiotracer uptake in a lesion in the superior external quadrant of the right breast, of about 1.5 cm in size with a maximum standardized uptake value ( $\text{SUV}_{\text{max}}$ ) of 5.3 (arrows).  $^{68}\text{Ga}$ -FAPI is a recently introduced imaging agent targeting fibroblast activation protein that is highly expressed in various tumors (1,2). Recent case reports reveal that the mean  $\text{SUV}_{\text{max}}$  of breast cancers and metastases were found to be high (3,4,5). A recent study showed that  $^{68}\text{Ga}$ -FAPI-04 PET/CT is superior to  $^{18}\text{F}$ -FDG PET/CT in detecting primary tumors in patients with breast cancer by demonstrating its high sensitivity, high  $\text{SUV}_{\text{max}}$ , and high tumor-to-background ratio (6).  $^{68}\text{Ga}$ -FAPI-04 PET/CT is also superior to  $^{18}\text{F}$ -FDG PET/CT in detecting lymph node, hepatic, bone, and cerebral metastases owing to its lower background activity and higher uptake in subcentimetric lesions (6). Thus, our case depicts that  $^{68}\text{Ga}$ -FAPI-04 PET/CT should be considered in cases with  $^{18}\text{F}$ -FDG-negative breast cancer.

## Ethics

**Informed Consent:** Written informed consent was obtained from the patient.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Surgical and Medical Practices: H.K., C.G., H.E., C.C., Concept: H.K., C.G., H.E., C.C., Design: H.K., C.G., H.E., C.C., Data Collection or Processing: H.K., C.G., H.E., C.C., Analysis or Interpretation: H.K., C.G., H.E., C.C., Literature Search: H.K., C.G., H.E., C.C., Writing: H.K., C.G., H.E., C.C.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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