

# Uterine metastasis from invasive ductal breast carcinoma mimicking fibroid features on MRI and detected by FDG PET/CT: role of SUVmax

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## Summary

Breast cancer rarely metastasizes to the uterus. In particular, lobular carcinoma of the breast more commonly spreads to the uterus when compared to invasive ductal carcinoma. PET-CT can be a tool to differentiate between fibroids and metastasis based on the maximum standardized uptake value (SUVmax). The authors report the case of a 37-year-old female with invasive ductal carcinoma (IDC) having significantly fluorodeoxyglucose (FDG)-avid masses on PET-CT which were later found to be metastases.

**Key words:** Breast cancer; Fibroids; Metastases; PET-CT.

## Introduction

Uterine involvement by metastatic breast disease is rare. The two most common types of breast cancer are invasive ductal carcinoma (IDC) and invasive lobular carcinoma (ILC). ILC is more likely to have metastases at presentation than IDC [1], and it more frequently spreads to the gastrointestinal system, peritoneum-retroperitoneum, gynecologic organs, notably the uterus [2], than does IDC.

Metastatic spread to the female genital tract from extragenital cancers is generally rare. The ovaries and vagina are the most common sites of metastasis from genital and extragenital primaries. Metastatic spread to the uterus and cervix is seldom seen and is estimated at 4.7% for the uterus and 3.4% for the cervix [3]. Cancers of the gastrointestinal tract followed by the breasts are the most common primary tumors that metastasize to the uterus [4].

The authors report the case of a 37-year-old woman with IDC of the breast with metastasis to the uterus, mimicking the appearance of fibroids on imaging.

## Case Report

A 37-year-old woman, gravida 5 para 5, presented to the outpatient clinic with a left breast lump of four months' duration. Medical history was significant for uterine fibroids, while surgical and family history were non-contributory. Ultrasound of the breast revealed a mass with infiltrative and irregular borders and microcalcifications, and the woman was subsequently diagnosed with breast cancer. Biopsy was performed and pathological examination revealed IDC grade 3/3. Immunohistochemical staining showed strong positivity for estrogen receptors (ER) and progesterone receptors (PR), and negative for *cerbB2*. CA 15-3 levels

were markedly elevated (203.1 U/ml).

A PET-CT was performed for staging. It showed a large, intensely fluorodeoxyglucose (FDG)-avid, retro-areolar mass in the left breast with enlarged left axillary, sub-pectoral and internal mammary lymph nodes. It also showed multiple large heterogeneously FDG-avid uterine masses, which could represent fibroids, measuring up to 8×8×7.8 cm with a maximum standardized uptake value (SUVmax) of 8.4, along with multiple lytic bone lesions consistent with metastatic disease. A MRI of the pelvis was performed and showed multiple enlarged uterine fibroids some of which were showing myxoid degeneration (Figures 1 and 2).

Due to the strong ER and PR positivity of the tumor, the decision was made to perform risk-reduction surgery. The patient underwent total abdominal hysterectomy and bilateral salpingo-oophorectomy which revealed metastatic ductal carcinoma of the breast involving the myometrium, and endocervix, with extensive lymphovascular invasion, multiple uterine leiomyomas, and normal endometrium (Figure 3).

## Discussion

Breast cancer most commonly metastasizes to the lungs, bones, liver, and brain [5]. Metastasis to genital organs, especially the uterus, is extremely uncommon. A study by Mazur *et al.* showed that out of 325 patients with metastases to genital organs from all cancers, only seven extragenital tumors had endometrial metastases, and only two of these cases were from breast cancer. In the event of breast cancer metastasis to the uterus, it involves the myometrium in 63.5%, the myometrium and endometrium in 32.7%, and endometrium only in 3.8% [3]. In the literature, there have been 25 reported cases involving breast cancer metastasis to the endometrium, including eight that have

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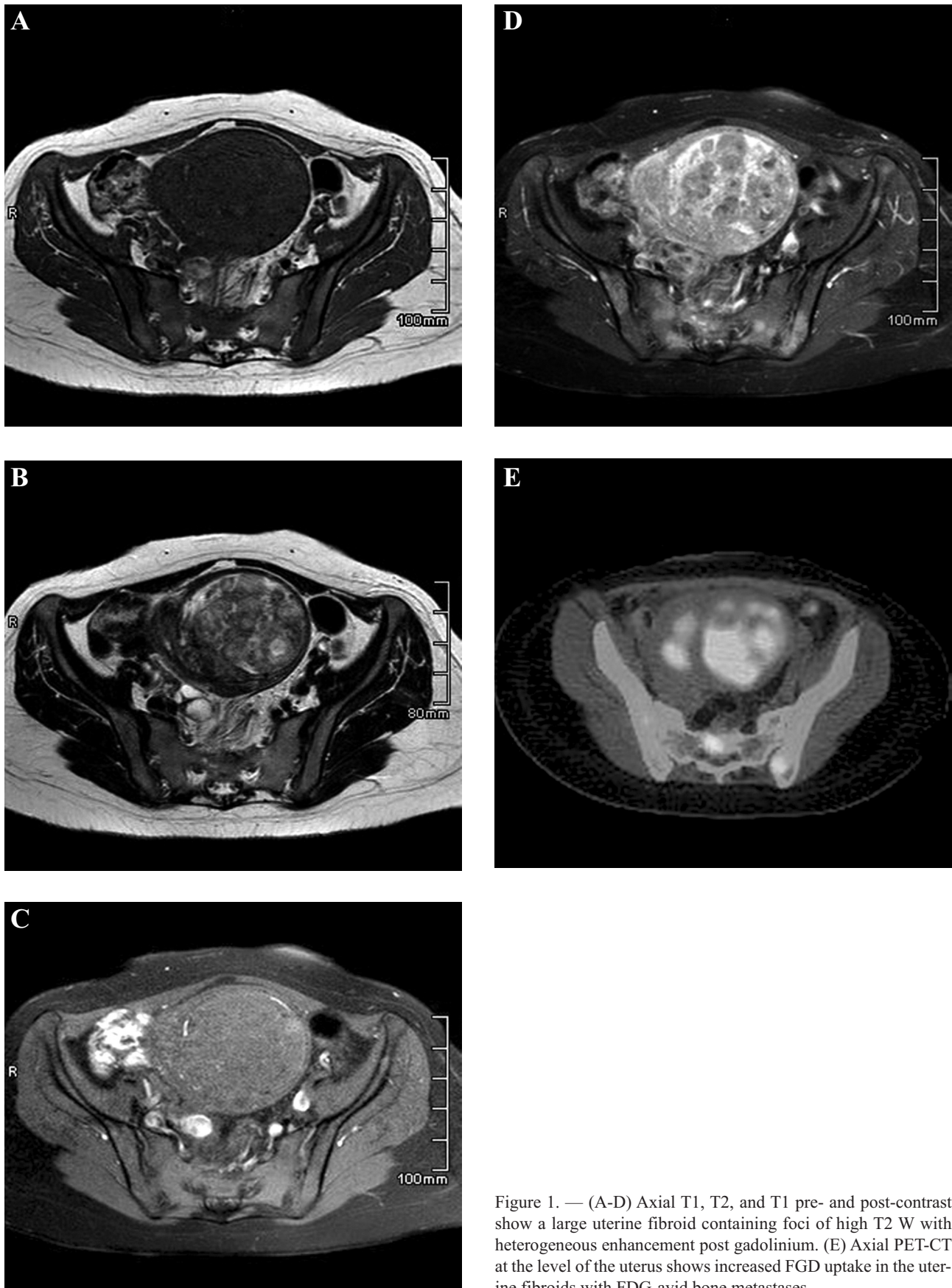


Figure 1. — (A-D) Axial T1, T2, and T1 pre- and post-contrast show a large uterine fibroid containing foci of high T2 W with heterogeneous enhancement post gadolinium. (E) Axial PET-CT at the level of the uterus shows increased FDG uptake in the uterine fibroids with FDG-avid bone metastases.



Figure 2. — (A) Coronal T2W of the pelvis shows multiple uterine fibroids. (B) Coronal PET-CT shows increased FDG uptake in the uterine fibroid.

spread additionally to the myometrium, with only three of them due to IDC [6].

FDG PET-CT has very high sensitivity and specificity in the assessment of female gynecological malignancies, notably endometrial cancer [7]. However uptake varies with

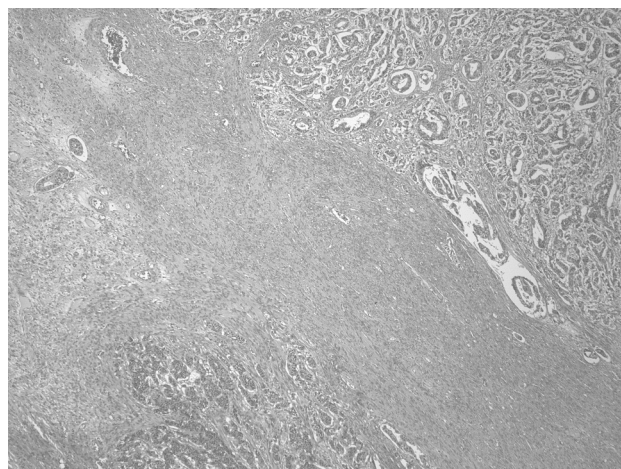


Figure 3. — Pathological microscopic examination demonstrating malignant epithelial tumor cells.

the menstrual cycle and its presence in a post-menopausal woman should raise the suspicion of malignancy [8]. Moreover, fibroids can show increased FDG uptake [8]. In fact, Saksena *et al.* reported 18% of fibroids in their series to be hypermetabolic [9]. Furthermore, a study performed by Katajima *et al.* showed that uterine fibroids show mild to moderate uptake on a study performed on 61 leiomyomas of 41 patients, with a mean SUVmax of  $2.34 \pm 0.75$ . The study also showed that the SUVmax increases with the degeneration of the fibroid [10]. Nishizawa *et al.* [11] also demonstrated further increased FDG activity during the luteal phase when compared to the follicular and ovulatory phases. In the present case report, the SUVmax was 8.4, significantly higher than the average of a uterine fibroid which should raise the suspicion of a possible malignancy. In addition, lobular carcinoma of the breast most commonly metastasize to the uterus as previously mentioned but in the present case, the primary malignancy was an IDC.

In conclusion, metastasis to the uterus can mimic fibroids, especially when the primary cancer is an unlikely source of metastasis to the uterus, and when the clinical background includes a known history of fibroids, a common gynecologic pathology. A SUVmax cut-off is highly important in differentiating between benign lesions and malignant ones.

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