

# Role of MRI and Plain Radiograph to Diagnose Fibrous Dysplasia Mimicking Metastasis on PET/CT in a Patient with Breast Cancer

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Fibrous dysplasia is a common benign disorder of bone in which normal bone marrow is replaced with fibro-osseous tissue. As PET/CT is increasingly used for the staging of different malignant disease, incidentally found fibrous dysplasia with increased FDG uptake may mimic metastasis. We report on a 46-year-old woman with fibrous dysplasia who underwent PET/CT because of suspected recurrence of breast cancer and was misdiagnosed as a bony metastasis with a focal FDG uptake on left proximal femur. This lesion was interpreted as fibrous dysplasia based on MRI in addition to the plain radiographs. We conclude that MRI in addition to radiography may help to differentiate fibrous dysplasia mimicking metastasis on PET/CT in the patients with malignancy.

**Key words:** fibrous dysplasia, PET/CT, MRI

Fibrous dysplasia is a common benign disorder of bone in which normal bone marrow is replaced with fibro-osseous tissue. Patients are often asymptomatic, and fibrous dysplasia is often detected incidentally in patients with malignancy in whom <sup>18</sup>F-fluoro-2-deoxy-glucose positron emission tomography (<sup>18</sup>F-FDG PET/CT) is performed for metastatic disease. PET/CT findings of fibrous dysplasia have been reported on several papers.<sup>1-5)</sup> The level of FDG uptake in fibrous dysplasia can be either intense or be normal with normal metabolism without any increased FDG uptake. Fibrous dysplasia may show the glucose avidity of the lesion and may mimic metastasis on PET/CT. In this clinical situation, fibrous dysplasia should be considered in differential diagnosis based on other imaging findings using MRI as well as radiography.

## Case Report

A 46-year-old woman underwent a wide excision and adjuvant

chemotherapy for breast cancer. At six months after the surgery, a focal hot uptake was found in left proximal femur on bone scintigraphy and was interpreted as a possible metastasis (Fig. 1A). Three days later, the patient underwent PET/CT. A focal FDG uptake was observed in left proximal femur on PET/CT and was interpreted as a single metastasis (Fig. 1B). The surgeon concluded the femoral lesion as an osteoblastic metastasis based on the findings on bone scintigraphy and PET/CT in addition to the sclerotic lesion on plain radiographs (Fig. 2). The patient had radiation on the lesion of left proximal femur. In five months after radiation, she was admitted for intermittent left hip pain for one month. She underwent MRI. There was a well-defined lesion in left proximal femur. It was hypointense on T1- and T2-weighted images (Fig. 3A, B). Moderate perilesional hyperintense signal was seen on fat-suppressed T2-weighted images (Fig. 3C). The mass showed mild contrast enhancement on contrast-enhanced T1-weighted images (Fig. 3D, E). Mild post-radiation edema was observed in adjacent soft tissue. MR images were interpreted as fibrous dysplasia in the left proximal femur after reviewing the plain radiographs. Limb salvage operation including a wide excision of left proximal femur was performed one week later. A pathologic examination revealed that fibrous tissue blended into the bone spicules, which had irregular shapes and

Received April 26, 2010 Revised June 1, 2010 Accepted June 11, 2010

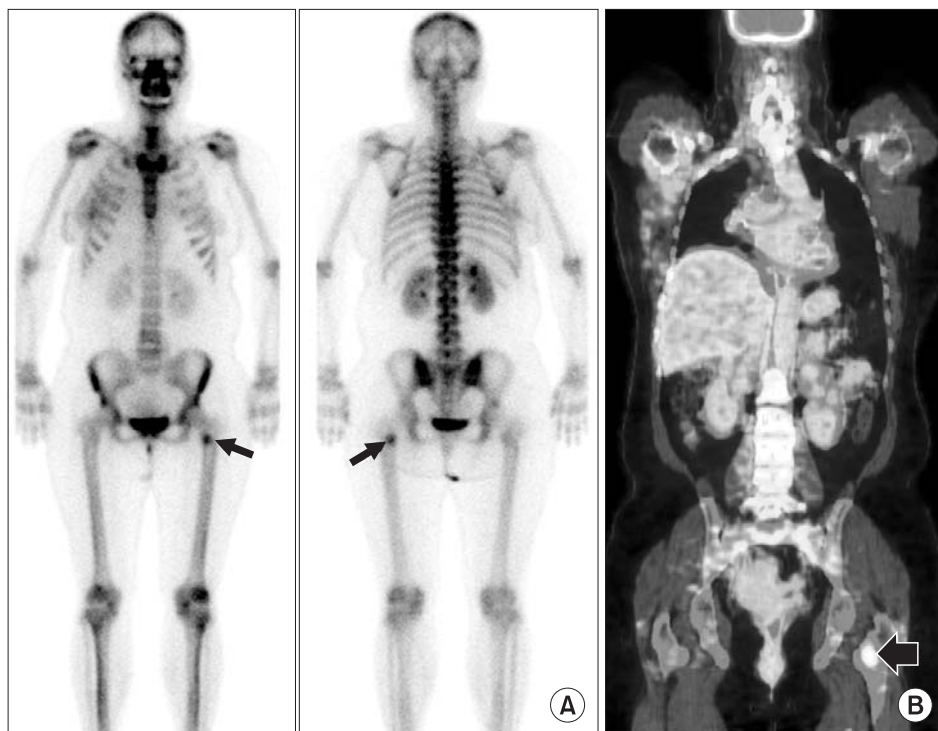
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대한골관절종양학회지 : 제16권 제1호 2010 Copyrights © 2010 by The Korean Bone and Joint Tumor Society

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**Figure 1.** A 46-year-old woman with breast cancer. Bone scintigraphy (A) shows a focal hot uptake (arrow) in left proximal femur. PET/CT (B) shows a focal FDG uptake (arrow) in left proximal femur and was mis-interpreted as a single metastasis from breast cancer.



**Figure 2.** Radiograph in a 46-year-old woman shows an intramedullary lesion with a diffuse sclerotic lesion (arrow) on left proximal femur.

imperceptible osteoblast rimming. Final diagnosis was made as a fibrous dysplasia (Fig. 4).

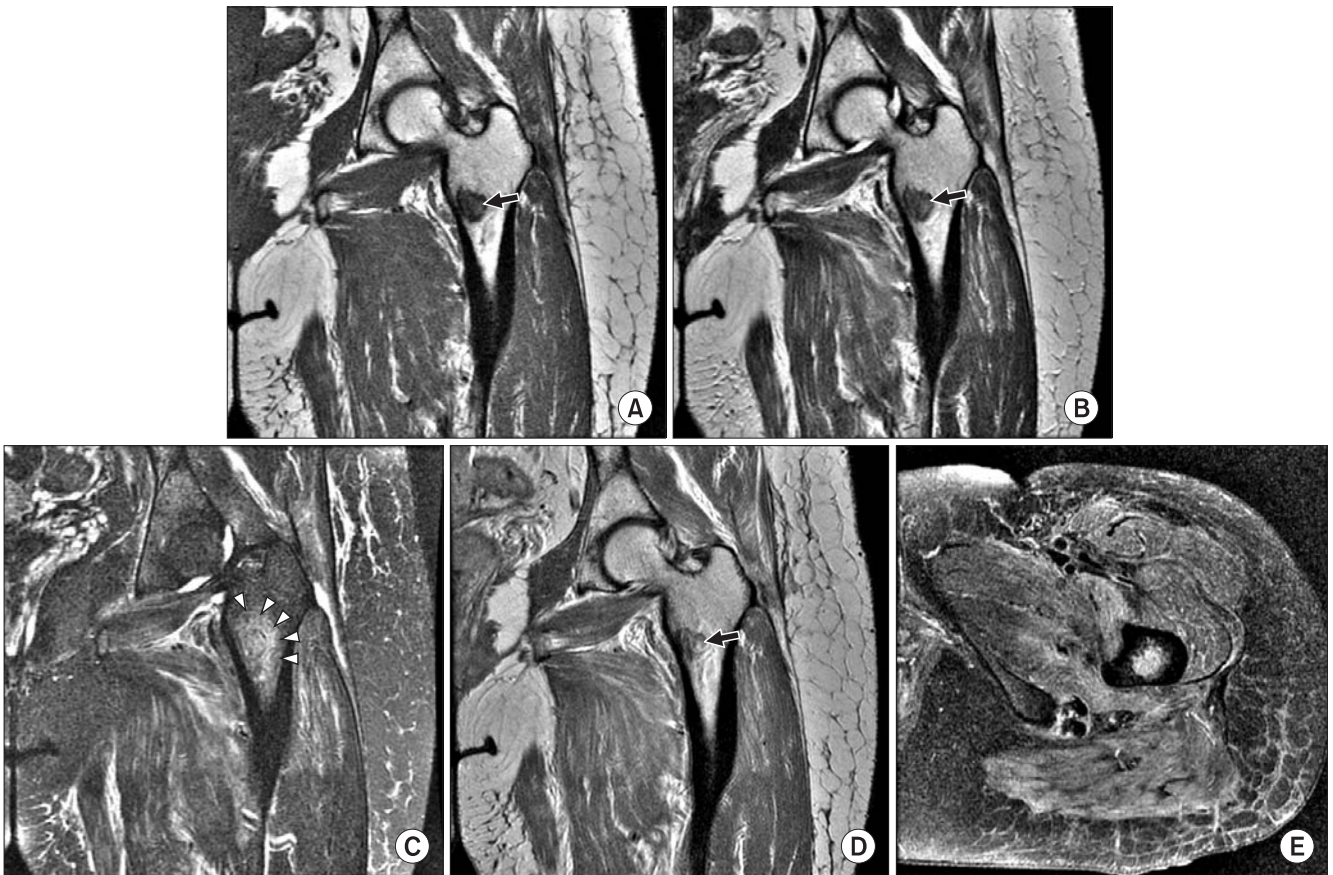
## Discussion

PET/CT is essential for the staging and localization of the metastatic lesion in the management of the patients with breast cancer. The skeleton is the most common site of distant metastases in patients

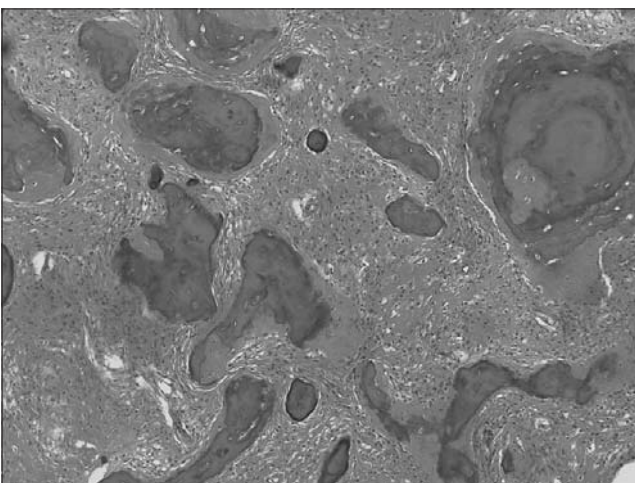
treated with mastectomy and adjuvant chemotherapy. PET/CT and bone scintigraphy have been shown to be complementary in the detection of skeletal metastases. PET/CT is more sensitive than bone scintigraphy for the detection of lytic metastases or lesions predominantly involving the bone marrow, whereas bone scintigraphy is more sensitive than PET/CT for the detection of osteoblastic metastases.<sup>6)</sup>

PET/CT findings of fibrous dysplasia are less well known since PET/CT does not have a role in the assessment of benign disease. However, as PET/CT is increasingly used for the staging of different malignant disease incidentally found fibrous dysplasia on PET/CT is reported on several papers.<sup>1-5)</sup> In our case fibrous dysplasia in left femur had a focal FDG uptake on PET/CT and this lesion was misdiagnosed as single metastasis from breast cancer following primary surgery and adjuvant chemotherapy.

Fibrous dysplasia is a benign disorder of unknown cause in which the normal bone structure is replaced by fibrous connective tissue. Radiography and CT can reveal the characteristic sclerotic and hyperplastic change in bone in fibrous dysplasia. MRI has been reported to identify specific findings of fibrous dysplasia.<sup>7-9)</sup> The characteristic MR findings of fibrous dysplasia are hypointense signal intensity on T2-weighted images in the substantial number of cases.<sup>7)</sup> Signal intensity on T1- and T2-weighted images and the degree of contrast enhancement on T1-weighted images depend on



**Figure 3.** A 46-year-old woman who underwent MRI for intermittent left hip pain after radiation for one month. Left proximal femoral lesion was interpreted as a fibrous dysplasia based on MR findings. T1-weighted (A) and T2-weighted (B) coronal images show a well-defined hypointense lesion (arrows in A and B) in left proximal femur. Fat-suppressed T2-weighted coronal image (C) shows moderate perilesional hyperintense signal (arrowheads) on the left proximal femur suggesting post-radiation edema. Contrast-enhanced T1-weighted coronal image (D) shows mild contrast enhancement in the mass (arrow). Axial fat-suppressed contrast-enhanced T1-weighted image (E) also shows mild contrast enhancement in the mass. Adjacent muscles in the medial compartment of the thigh shows relatively well-demarcated contrast enhancement, suggesting post-radiation edema.



**Figure 4.** In microscopic examination, fibrous tissue blended into the bone spicules, which had irregular shapes and imperceptible osteoblast rimming (H&E  $\times 100$ ).

the amount of bony trabeculae, cellularity, collagen, and cystic and hemorrhagic changes.<sup>7</sup> Fibrous dysplasia was interpreted based on MRI in addition to plain radiographs in our case. We conclude that MRI may help to differentiate fibrous dysplasia from metastasis in addition to the radiographic findings, which may mimic metastasis on PET/CT in a patient with primary malignancy.

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## 유방암환자의 양전자방출단층촬영술에서 암 전이로 오인된 섬유형성이상 진단의 자기공명영상과 단순촬영의 역할

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섬유형성이상은 골수가 섬유-골성 조직으로 치환되는 흔한 양성 골 질환이다. 암환자에서 병기의 결정과 추적 검사 시 암 전이의 발견에 PET/CT의 역할이 증가됨에 따라 우연히 발견된 FDG 섭취 증가를 보이는 섬유형성이상에서 암 전이와의 감별이 중요하다. PET/CT를 시행한 46세의 유방암 환자에서 좌측 대퇴골에 국소 FDG 섭취를 보여 암 전이로 의심되었으나 단순촬영과 자기공명 영상 소견에서 섬유형성이상으로 진단한 환자의 증례를 보고하고자 한다. 이 환자에서 단순촬영과 자기공명영상 소견은 PET/CT에서 유방암 전이로 오인된 섬유형성이상의 감별에 도움이 되었다.

**색인단어:** 섬유형성이상, PET/CT, 자기공명영상

접수일 2010년 4월 26일 심사수정일 2010년 6월 1일 게재확정일 2010년 6월 11일  
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