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Unexpected Focal ^{18}F -FDG Uptake in the Breast on PET/CT: An Ultrasonographic Evaluation

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Purpose: With the increase in use of PET/CT for the evaluation of cancer patients and screening purposes, unexpected focal ^{18}F FDG uptakes have been occasionally identified. The purpose of this study was to evaluate the diagnostic value of breast ultrasonography (US) in distinguishing benign from malignant ^{18}F FDG uptakes incidentally found on PET/CT.

Materials and Methods: Between April 2004 and January 2010, 5214 consecutive patients underwent PET/CT, of which 2.03% (106 of 5214) of the patients underwent breast US due to unexpected ^{18}F FDG uptakes in the breast. Patients with primary breast cancers ($n = 70$) or patients without histology ($n = 9$) were excluded. Finally, 27 patients (mean age 46, range 33–62 years, 26 females and 1 male) who underwent PET/CT and breast US for the evaluation of breast ^{18}F -FDG uptake were included. Eighty five% (23/27) of the patients underwent PET/CT for the staging of known malignancies of which lung cancer ($n = 4$) and thyroid cancer ($n = 4$) were the most common. The remaining 15% (4/27) were healthy women for screening purposes. Maximum standardized uptake values (SUVmax) of the lesions on

PET/CT and prospectively classified BI-RADS final assessment category on breast US were compared in distinguishing benign from malignant lesions.

Results: Of the 27 lesions, 14 (52%) lesions were malignant (10 invasive cancers, 2 DCIS, 2 lymphomas) and 13 (48%) were benign with fibrocystic change ($n = 4$), fibroadenoma ($n = 2$), and papilloma ($n = 2$) being the most common. The mean SUVmax of the malignant lesions was higher than that of benign lesions (4.038 ± 1.989 vs. 2.195 ± 1.217 , $p = 0.008$) and the rate of malignancy according to the final assessment category on breast US was 0% (0/6) for category 3, 29% (2/7) for category 4a, 50% (1/2) for category 4b, 83% (5/6) for category 4c, and 100% (6/6) for category 5 ($p < 0.001$).

Conclusion: The malignancy rate of incidentally found focal breast uptakes on PET/CT was 52%. The SUVmax of malignant lesions was higher than that of benign lesions and the probability (0%) of malignancy was much lower when US findings appeared benign.

Clinical Relevance/Application: Breast US evaluation can help differentiate benign from malignant focal breast uptakes which are incidentally found on PET/CT.