新たな画像診断法により小さな乳房腫瘍を検出できる

新たな高分解能陽電子乳房撮影によりMRIよりも少ない偽陽性率で腫瘍が有効に検出できる

New high-resolution breast PET effectively detects tumors with fewer false-positive results than MRI

新たな画像診断法である陽電子乳房撮影（PEM）は、乳がん既往歴のある女性の2mmほどの小さながんを有効に検出するとRadiological Society of North America（RSNA）学会で発表された。PEMは乳がん細胞のフルオロデオキシグルコースの取り込みを計測することにより細胞の活性を評価する。この方法は、標準的なマンモグラフィやMRIではその有効性を制限する2つの因子である乳房濃度や女性のホルモン状況に影響されない。米国の研究者らは高分解能乳房陽電子断層撮影（PET）を適用したPEMを施行された乳がん患者208人の結果を発表した。撮影を行った189の悪性病変のうちPEMは176病変を検出し、全体の感度は93%（15%は非浸潤性乳管がん、85%は浸潤がん）であった。PEMはfatty breastsの100%、dense breasts（高濃度乳房）の93%、極端な高濃度乳房の85%、ホルモン補充療法歴のあるまたはない女性の93%、閉経前女性の90%および閉経後女性の94%のがんの検出に成功した。筆者らは、この検査法はグルコースベースの放射性トレーサーを使用し空腹時に行うため、糖尿病患者には適さないと警告している。

Full Text

A new imaging modality, positron emission mammography (PEM), effectively detects breast tumors as small as 2 mm in women with a history of breast cancer according to a study presented at the annual meeting of the Radiological Society of North America (RSNA). PEM is not affected by either breast density or a woman's hormonal status, two factors that limit the effectiveness of standard mammography and MRI at detecting cancer.

"The ability of PEM to detect cancer does not appear to be adversely affected by breast density, hormone replacement therapy or menopausal status," said lead researcher Kathy Schilling, M.D., director of breast imaging and intervention at the Center for Breast Care at Boca Raton Community Hospital in Florida. "The sensitivity of PEM is equal to or better than breast MRI, and PEM has fewer false-positive results."

The ability of x-ray mammography, a standard screening tool for breast cancer, to detect lesions is reduced when performed on dense breasts, where tissue is less fatty and more glandular. Breast MRI is effective at detecting cancer in dense breasts and is increasingly being used to screen women at high risk for breast cancer. However, MRI has a high incidence of false-positive test results that indicate cancer is present when it is not. Researchers believe these false positives are due in part to hormonal changes that occur during a woman's menstrual cycle.

"Unless the MRI is performed on day seven through 14 of a woman's cycle, reading MRI images is extremely difficult," Dr. Schilling said. "This is a significant problem with breast MRI."

PEM assesses cellular activity by measuring uptake of fluorodeoxyglucose by breast cancer cells. It is not affected by either breast density or a woman's hormonal status. Because hormones do not have the same effect on PEM results, Dr. Schilling believes the imaging technique could play a significant role both in preoperatively evaluating breast cancer patients and in screening high-risk patients.

In the study, 208 patients with breast cancer underwent PEM, an application of high-resolution breast positron emission tomography (PET) in which a small amount of radioactive material is injected into the body to measure metabolic activity and determine the presence of disease. The researchers used a PET unit specially developed for the breast and small body parts to perform the PEM exam.

Of 189 malignant lesions imaged, PEM detected 176 for an overall sensitivity rate of 93 percent. Fifteen percent were ductal carcinoma in situ (DCIS) and 85 percent were invasive cancer.

PEM successfully detected cancer in 100 percent of fatty breasts, 93 percent of dense breasts, 85 percent of extremely dense breasts, 93 percent of women both with and without a history of hormone replacement therapy, 90 percent of pre-menopausal women and 94 percent of post-menopausal women.

According to Dr. Schilling, PEM is well tolerated by patients, who sit upright during the exam and are not alone or closely confined as they would be during an MRI exam. While breast MRI exams produce more than 2,000 images to be interpreted, PEM produces just 48 images that can be correlated with a woman's mammogram.

"PEM is easier to use, easier to interpret and easier on the patients than MRI," Dr. Shilling said. "It is also ideal for those patients whose MRI is difficult to interpret due to hormonal influences, women with implants, patients with metal in their bodies, or patients who suffer from claustrophobia. It is exciting that we now have a functional imaging approach with high sensitivity that compliments our current anatomic imaging modalities," she added.

The authors cautioned that since the procedure uses a glucose-based radiotracer and is performed when the patient is fasting, it is unsuitable for diabetic patients.

Co-authors are Deepa Narayanan, M.S., and Judith Kalinyak, M.D., Ph.D.