AbstractID: 14427 Title: Postron Emission Mammography

Specialized positron emission tomography (PET) systems dedicated to imaging breast cancer have been proposed and developed since the mid-1990s. The term positron emission mammography (PEM) has been applied to this specialized area of PET scanners and scanning.

While progress has been made in reversing a long increasing trend of breast cancer deaths in the U.S. and elsewhere, there is still a relatively high incidence of breast cancer diagnosis and mortality: an estimated 192,000 cases, and 40,000 deaths in the U.S. in 2009. This is the second leading cause of cancer deaths in women in the U.S. Screening X-ray mammography has played an important role in reversing the trend of increasing deaths, and is the primary imaging modality for breast cancer screening. A limitation of screening and diagnostic mammography is its lack of specificity to malignant disease, resulting in many false positives. A number of imaging methods are used to further investigate equivocal mammography findings, including ultrasound, magnetic resonance imaging (MRI), scintigraphy, and PEM.

PET is a functional imaging modality used routinely in oncology to image hyper-metabolic lesions, including breast cancers. However, the spatial resolution of whole-body PET (WB-PET) scanners limits their usefulness in early breast cancer because lesion sizes at diagnosis tend to be smaller than can be reliably imaged with WB-PET. Dedicated PEM systems focus on improved spatial resolution for imaging early breast cancer, and its functional nature is seen to complement the morphological information provided by mammography. One proposed use of PEM is to improve specificity in diagnosing suspicious but equivocal findings in mammography. PEM has also been suggested for identifying multi-focal, multi-centric, or bilateral disease for purposes of planning surgical treatment, for guiding and monitoring therapies, and for better identification of ductal carcinoma in situ.

This lecture will provide a brief history of PEM development, give the current status of PEM, compare PEM to WB-PET and mammography, and discuss clinical applications and operations.

Learning Objectives:
At the end of this lecture, attendees should be able to
1. Understand the differences between whole-body PET and PEM
2. Understand the differences between mammography and PEM
3. List possible clinical applications/indications for PEM
4. Describe clinical operation and requirements of PEM scanning