AbstractID: 11931 Title: Molecular Imaging of the Breast

Recent controversy over the efficacy of screening mammography highlights the need for more effective breast imaging techniques. While the sensitivity of mass breast cancer screening with mammography is in the range 60% - 90%, numerous studies have demonstrated that this sensitivity is reduced to less than 50% in radiographically dense breasts. Hence there is need for an alternative screening technique, particularly in women with radiographically dense breasts. A recent ACRIN trial shows that whole breast ultrasound had comparable performance to mammography. Breast MRI performs very well in this population, but high cost and variable specificity limit its application.

Conventional scintimammography has a high overall sensitivity and specificity for the detection of breast cancer. However sensitivity drops to ~50% for the detection of breast lesions less than 15 mm in diameter, making it unsuitable as a diagnostic or screening tool. Molecular Breast Imaging (MBI) refers to a new technique that employs small field of view gamma cameras specifically designed for breast imaging. These cameras utilize either multi-crystal arrays of Sodium Iodide (NaI) or more recently, use semiconductor materials such as Cadmium-Zinc-Telluride (CZT). Using Tc-99m sestamibi as the primary radiopharmaceutical, MBI has been shown to have a high sensitivity (~90%) for the detection of breast lesions < 10 mm in diameter. Hence, MBI may be a valuable screening tool, particularly for women in whom the sensitivity of conventional mammography is reduced by the density of the breast parenchyma.

This presentation will review the basic principles of molecular breast imaging, and present current clinical results. It will also present details of prototype systems currently under development and future plans for this technology.

Learning Objectives:

1. Understand the limitations of current imaging techniques of the breast, including mammography, ultrasound, MRI and scintimammography.
2. Understand the basic concept of multi-crystal and semiconductor-based gamma cameras.
3. Describe the relative advantages and disadvantages of scintimammography and molecular breast imaging.
4. Understand the potential advantages/disadvantages and future applications for this technology in the detection and understanding of breast cancer.