

For almost 70 years mammography has given us insight into breast morphology, allowing cancer detection based on the gross impact of the disease upon body. The advent of tomographic techniques has allowed visualization of morphologic perturbations at a much smaller scale using various techniques including digital breast tomosynthesis (DBT), computed tomography (CT), ultrasound, and magnetic resonance imaging (MRI).

An alternative strategy to improve early detection is to search for functional changes. In 2007, the American Cancer Society revised their breast cancer screening recommendations. Annual screening by mammography is still recommended for women at low-to-medium risk for breast cancer; however, women at high risk for breast cancer are now recommended to have annual mammography and MRI. This recommendation is supported by studies which show that MRI is capable of demonstrating mammographically occult breast cancer both in both screening and diagnostic populations.

Contrast-enhanced (CE) radiographic methods, including CE-mammography, CE-DBT and CE-CT, have the potential to rival breast MRI as a sensitive method for diagnosis and screening of breast cancer. In a pilot study of CE-DBT conducted at the University of Pennsylvania, suspicious enhancing lesions were demonstrated in 14 of 15 cases of breast cancer. The pre-contrast tomosynthesis images demonstrated lesion morphology and border characteristics in greater detail than digital mammography, while the subtracted contrast-enhanced tomosynthesis images demonstrated the vascular characteristics of the breast lesions in a manner consistent with breast MRI.

Further advances in CE imaging will be predicated upon a shift in our attention from imaging perfusion to imaging specific molecular/cellular events. Research is ongoing in the discovery of specific biological prognostic factors, the development of appropriate imaging technologies and imaging agents, and the adaptation of these technologies to image-guidance and monitoring of therapeutic interventions.

In this presentation, the following education objectives will be addressed:

1. Review the development of contrast-enhanced breast imaging.
2. Evaluate the results of the existing contrast-enhanced clinical trials.
3. Examine the clinical roles for contrast-enhanced imaging.