AbstractID: 14540 Title: Tissue Discrimination Methods in Mammography and Tomosynthesis

Breast imaging is undergoing a revolution towards quantitative tomographic methods. There is active research and development of both dedicated computed tomography, and digital breast tomosynthesis (DBT) or limited-angle computed tomography. Numerous clinical DBT trials are in progress and two systems are available in Europe. DBT has been shown to have clear value in increasing the conspicuity of lesions by removing overlaying structures present in mammograms.

We have recently installed a Hologic Dimensions DBT prototype that has been modified to allow contrast-enhanced (CE) imaging. Both dual-energy and temporal CE-DBT are under investigation. Current research is focused on the development and validation of precise image-derived metrics (image-based biomarkers) with physiologically relevant parameters, including treatment response to interventions and clinical outcomes. Our work continues with technique optimization, reconstruction algorithm development, motion correction, and scatter and other signal dependent corrections.

With appropriate corrections, CE-DBT can accurately quantify contrast agent uptake. In previous work, we have shown that CE-DBT can provide results concordant with dynamic contrast-enhanced MR in a group of 17 women with known or suspected breast cancer. As such, we believe that CE-DBT has potential in the same roles as MR. These roles include screening high-risk populations, staging cancer patients through identification of multifocal, multicentric and contralateral cancer, and assessment of tumor response to neoadjuvant chemotherapy.

Finally, there is a revolution in radiographic contrast agents. Taking inspiration from nuclear medicine and optical imaging, we are seeing an increase in research into radiographic contrast agents. These developments are made possible given recent advances in nanoparticles such as designer liposomes, polymersomes and nanospheres. Both blood-pool and targeted contrast agents are under investigation.

Learning Objectives:

1) Review the state-of-the-art in DBT system design
2) Describe adaptations necessary to perform quantitative CE-DBT
3) Exemplify the clinical applications of CE-DBT

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