

AbstractID: 11932 Title: MR-Guided Near Infrared Spectral Tomography of the Breast

Near-infrared (NIR) spectral tomography applies and records multiple wavelengths of light in the 700-850 nm range through a transceiving multi-fiber array in order to estimate absorption chromophores and scattering parameters within tissue. The technique provides important functional information associated with local concentrations of oxygenated and deoxygenated hemoglobin, oxygen saturation, and water and lipid fractions but on a centimeter spatial scale. In an effort to improve the spatial discrimination of these molecular characteristics of tissue, the technique has been combined with high resolution anatomical information obtained from MRI. Technical developments have lead to a simultaneous multi-modality breast exam which combines the spectral NIR information with the data obtained during a dynamic contrast-enhanced breast MR study. Commercial and custom breast coils have been populated with a 16-channel fiber optical array and concomitant data acquisition module to explore the clinical potential of the approach. Clinical breast exams involving women with asymptomatic and symptomatic screening and diagnostic mammography along longitudinal studies of women with locally advanced breast cancer receiving neoadjuvant chemotherapy have been performed. Results will be presented from anecdotal case reports as well as statistically valid findings from small clinical study designs and phantom experiments which indicate that the technique produces quantitative estimates of the NIR functional parameters at substantially improved spatial resolution relative to NIR spectral tomography when used in the breast alone.

Learning Objectives:

1. To learn the basic physical principles of NIR spectral tomography.
2. To learn the basic clinical and physical characteristics of combined MR and NIR spectral tomography.
3. To learn the latest clinical breast imaging results from the technology as developed by Dartmouth investigators.