AbstractID: 14409 Title: Pulse Sequences and Acquisition Techniques for Breast MRI

Dynamic contrast enhanced MRI (DCE-MRI) of the breast using a gadolinium contrast agent has become an important diagnostic tool for evaluating disease extent, monitoring therapy response and for screening women that are at high risk for breast cancer.

The sensitivity of DCE-MRI for detecting cancerous lesions is primarily determined by the degree of contrast enhancement that can be achieved relative to the surrounding normal tissues. The specificity of DCE-MRI, for distinguishing malignant from benign lesions, often relies upon the DCE-MRI kinetic data. Malignant lesions generally exhibit rapid uptake and washout while benign lesions typically have a slower uptake that gradually increases with time.

In an effort to achieve both the high sensitivity and specifically, breast MRI pulse sequences should be optimized to achieve high gadolinium contrast enhancement, high three-dimensional spatial resolution (< 1 mm in-plane) as well as adequate temporal resolution. The evolution of breast MR imaging has lead to the general use of fat-suppressed, 3D T1-weighted gradient-echo pulse sequences that can be acquired with a temporal resolution of approximately 60 seconds.

Learning Objectives

1) Review protocols and pulse sequences used for breast MR imaging.
2) Review the MRI timing diagram used for T1-weighted, fat-suppressed, 3D gradient echo-pulse sequences.
3) Understand how k-space sampling affects temporal resolution.
4) Review how parallel imaging can be used to help achieve the temporal resolution needed for breast DCE-MRI.
5) Discuss issues related to data acquisition and post-acquisition image processing.