Award ID:
RP140781

Project Title:
High-Field Open MRI: Cost-Effective Screening for Early Detection of Breast Cancer

Award Mechanism:
High Impact/High Risk

Principal Investigator:
McIntyre, Peter

Entity:
Texas A&M Engineering Experiment Station

Lay Summary:

Breast cancer is the most common cancer in women. In 2014 230,000 women will be diagnosed with breast cancer and 40,000 will die from it. The best hope for a cure is early detection, and mammography is widely used for early detection. Mammography is effective for early detection in women with fatty breasts, but half of all women have dense breasts, and the fibrous tissue in the breast makes early detection extremely difficult. Dye-contrast MRI is effective for early detection in dense breasts, but it is expensive: it is performed in a 1.5 Tesla whole-body MRI imager, the images typically cost ~$2,000/patient, and so it is not affordable as a screening methodology. Prof. McIntyre has formed a collaboration to develop a Compact OpenMR Imager that can produce the same dye-contrast images with a target imaging cost of $250/patient and so would be affordable for routine annual screening. Its low cost arises from its compact size - it can be staged entirely within a single room of a clinic or doctor's office; it can even be mounted on a truck for a mobile screening clinic. The Compact OpenMR Imager uses a structured coil to project the uniform field needed for imaging out of the flat, donut-shaped magnet, so that a woman can lie in a prone position on a flat table during imaging. The open geometry of the unit is comfortable for the patient, and the clinician can have full access to the patient during imaging. The system’s open geometry can support MR-guided biopsy to provide precise control of the location being biopsied. This academic/industry partnership can carry the development through R&D to manufacture and rapidly bring Compact Open MR into practice once its performance is proven. The structured coil approach can also be used for MR-guided non-invasive cancer therapy, in which high-intensity focused ultrasound is used to kill the cells of a cancer without harming nearby healthy cells. The method requires precise control and clear imaging of the tumor.