Background

Standard magnetic resonance imaging (MRI) is a sensitive (94%) screening test for detecting breast cancer, but can lack specificity (26%). To obtain a definitive diagnosis, patients undergo percutaneous biopsy and/or surgical resection of suspicious lesions. However, preparation for pathological analysis takes at least 12 hours, which limits the value to the surgeon. Subjective selection of slices by the pathologist also introduces the possibility of sampling error.

Invention Summary

Cornell inventors have developed systems and methods involving tissue preparation, a custom-built transmission/receiving coil and an MRI system to obtain ex-vivo images from tissue. Benign and malignant breast tissues and lymph nodes were imaged using this system. This system can achieve an imaging spatial resolution of 60 x 60 x 90 μm³, which is orders of magnitude better than conventional breast MR imaging. This process, generally referred to as Magnetic Resonance Microscopy (MRM), may be achieved in approximately 1 hour.

Potential Applications

- Quick pathological analysis of breast cancer, lymph nodes and other tissues, which can potentially guide intra-operative decision making for a surgeon
- Provide a navigation tool to guide a pathologist to areas of interest within a resected specimen

Advantage

- The speed of the technique offers the possibility to guide intra-operative decision making
- Achieve an imaging spatial resolution of 60 x 60 x 90 μm³, which is capable of revealing characteristic features of both benign and malignant tissue
- Images can be obtained through an entire resected specimen without physically slicing the tissue, reducing sampling error

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