

## Systems and Methods for MR Microscopy and Pathological Analysis of Resected Tissue

### Technology Summary

This technology provides systems and methods to image resected tissue at high resolution using magnetic resonance microscopy for pathological analysis.

### Technology Overview

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.

This technology includes systems and methods to image resected tissue at high resolution using MR imaging. The methods include 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 technology can achieve an imaging resolution of  $60 \times 60 \times 90 \mu\text{m}^3$ , which is orders of magnitude better than conventional breast MR imaging. This process enables rapid imaging analysis, with results achieved in approximately 1 hour. As such, this technology may provide a tool for intra-operative decision-making in addition to standard pathological analysis.

### Potential Applications

- Rapid pathological analysis of breast cancer, lymph nodes, and other tissues
- Intra-operative decision-making tool for surgeons
- Navigation tool to guide pathologist to areas of interest within a resected specimen

### Advantages

- Rapid analysis is compatible with intra-operative decision making
- High spatial resolution readily distinguishes between benign and malignant tissue
- Images are obtainable through an entire resected specimen without physical slicing, reducing sampling error

### Publications

- [Dashevsky et al.](#) "The Potential of High Resolution Magnetic Resonance Microscopy in the Pathologic Analysis of Resected Breast and Lymph Tissue." *Scientific Reports*. 2015.
- US Patent: [10,830,844](#). "Systems and methods for MR microscopy analysis of resected tissue." Granted Nov 10, 2020.

#### Inventors:

Douglas J. Ballon  
Brittany D. Zadek  
Krishna Juluru  
Eric Aronowitz  
Henning U. Voss

#### Location:

Weill Cornell Medicine

#### Patents:

[Granted](#)

#### Licensing Contact:

Donna Rounds  
(646) 962-7044  
[djr296@cornell.edu](mailto:djr296@cornell.edu)

#### Cornell Reference:

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