



## Non-Invasive Magnetic Resonance Thermometry in the Presence of Water and Fat

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**WARF: P07433US02**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a non-invasive method of measuring temperature change in tissue using magnetic resonance imaging (MRI).**

### Overview

Nuclear magnetic resonance is the property of magnetic nuclei used in medical imaging techniques like MRI to produce images. The nuclear magnetic resonance of water is known to be dependent on temperature, and can therefore be used to non-invasively measure temperature changes of tissue using MRI. However, the nuclear magnetic resonance of fat is not dependent on temperature, and this property causes corruption in images when attempting to use conventional MRI thermometry methods.

Evaluating temperature change in tissue is highly desirable in cancer treatment techniques such as hyperthermia where measurement and control of the temperature of a tumor and the surrounding tissue is a key factor in successful treatment. Invasive techniques for measuring temperature are accurate and precise, but complete temperature mapping of a region using MRI would improve control of the temperature distribution. A method of non-invasive temperature measurement is needed to improve temperature-related cancer treatments, including radiofrequency ablation to heat tumors and cryoablation to freeze tumors.

### The Invention

UW-Madison researchers have developed a method to use images obtained with water-fat signal separation techniques to non-invasively measure temperature change in tissue. The temperature in tissue containing both water and fat can be obtained by calibrating the image reconstruction using the relative frequency between water and fat as an internal reference, avoiding the challenges of reference images in MRI thermometry. The IDEAL water-fat image separation technique (see WARF reference number P090389US01) also could be used to avoid corruption of MRI temperature measurement by removing the fat signal and maintaining only the dependent water signal. These methods allow the generation of a complete temperature map of tissues that contain both fat and water.

### Applications

- Cancer treatment methods requiring non-invasive temperature monitoring of the affected tissue and surrounding area, including hyperthermia, radio frequency ablation and cryoablation

### Key Benefits

- Eliminates corruption of conventional MR thermometry methods due to the presence of fat in tissue
- Allows non-invasive, complete temperature mapping of tissue containing water and fat
- Improves control of temperature-dependent cancer treatments

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#### For More Information About the Inventors

- [Scott Reeder](#)

#### Related Technologies

- [For more information about the IDEAL method of water-fat signal separation for improved MRI imaging, see WARF reference number P090389US01.](#)

#### Tech Fields

- [Medical Imaging : MRI](#)

For current licensing status, please contact Jeanine Burmania at [jeanine@warf.org](mailto:jeanine@warf.org) or 608-960-9846

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