



## Probing Disease Chemistry with Joint Spatial and Spectral Imaging

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**WARF: P130133US01**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for simultaneously reconstructing spatial and spectral data with an MRI system, supporting the use of hyperpolarized imaging compounds.**

### Overview

Magnetic resonance spectroscopy (MRS) provides a noninvasive means of discovering and quantifying chemical compounds within an area of interest like the brain. The underlying principle is that the atomic nuclei of different molecules and compounds are shielded by a unique, telltale cloud of electrons. By reading the spectral patterns that result, doctors can identify the chemical species and metabolites indicative of Alzheimer's disease, cancer, stroke and other pathologies.

Recent advances in hyperpolarization (HP) techniques mean that molecular agents, such as  $^{13}\text{C}$ , can be injected and tracked through the metabolic processes of the human body. This empowers MR imaging to probe disease and disorder at the molecular level. However, imaging (HP)  $^{13}\text{C}$  compounds is more challenging than other contrast agents because of fast polarization decay. Conventional spectroscopic imaging approaches like chemical shift imaging (CSI) and spiral CSI have proven inadequate.

### The Invention

UW–Madison researchers have developed a method for simultaneously generating spectral and spatial images of a subject using an MRI system.

A subject receives a dose of hyperpolarized imaging compound. MR image data is acquired from the subject according to a k-space sampling trajectory that spatially oversamples to encode both spatial and spectral frequency information at the oversampled points. The MR image data then can be reconstructed into the different image types using a model-based reconstruction technique and prior knowledge of the chemical species associated with the compound.

### Applications

- Model-based reconstruction approach for spatially and spectrally investigating a subject
- MR software for use with hyperpolarization techniques

### Key Benefits

- Single-shot approach
- Faster, more efficient data acquisition

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### Additional Information

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#### For More Information About the Inventors

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#### 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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