Improved Images with MRI Acquisition of Multiple Chemical Species

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved imaging method to produce high-resolution images of multiple chemical species.

OVERVIEW

UW–Madison researchers have previously developed "IDEAL," a multi-echo chemical species separation technique that uses iterative decomposition of water and fat with echo asymmetry and least squares estimation. IDEAL has been shown to separate water and fat effectively with a number of different acquisition methods. It was developed to address limitations of conventional chemical species separation techniques, known as Dixon methods, that exploit differences in resonance frequencies between chemical species. Dixon methods require specific echo spacing, which can be difficult to reconcile with other timing requirements. IDEAL allows flexibility in echo spacing and better accommodates timing requirements of various sequences; however, it requires redundant sampling, which limits the spatial resolution achievable in a set scan time.

Previous attempts at improving spatial resolution with IDEAL have been unsuccessful. Improved imaging with chemical species separation would be beneficial for water-fat separation, in which high spatial resolution water and fat images can be produced. A need exists for imaging methods to acquire high spatial resolution images that can be used with chemical species separation techniques such as IDEAL to produce decomposed signals representative of individual chemical species.

THE INVENTION

UW–Madison researchers have developed a method for producing a high-resolution image of a subject with a magnetic resonance imaging (MRI) system where the image depicts signal contributions from only one chemical species. A unique set of radial lines is acquired at a sequence of multiple echo times occurring within two or more repetition times (TRs). Odd-numbered echoes are sampled during odd-numbered TRs, and even-numbered echoes are sampled during even-numbered TRs. Images are reconstructed and used to calculate the respective signal contributions of two or more chemical species using a species separation technique such as IDEAL. The signal contributions then are used to produce images that primarily depict only one of the chemical species, such that it

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

is possible to produce separated water and fat images.

This imaging method provides superior separation of water and fat signals while allowing the acquisition of high-resolution image data sets. Additionally, the method provides for effective water-fat separation despite sampling a unique set of radial lines at each echo time.

APPLICATIONS

- MRI software and/or systems

KEY BENEFITS

- Eliminates redundant sampling
- Improves MRI image quality
- Provides superior separation of water and fat signals
- Reduces artifacts in imaging multiple chemical species

ADDITIONAL INFORMATION

Tech Fields
Medical Imaging - MRI

CONTACT INFORMATION

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846.