



Method for Improved Fat-Water Signal Separation in Phase Contrast Magnetic Resonance Imaging

[View U.S. Patent No. 8,148,984 in PDF format.](#)

WARF: P08394US02

Inventors: Kevin Johnson, Alexey Samsonov

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a multi-measurement method for separating fat and water signals in phase contrast magnetic resonance imaging.

Overview

Phase contrast magnetic resonance imaging (PC MRI) can be used to improve diagnostic accuracy of vascular, musculoskeletal and cerebrospinal exams. PC MRI functions by receiving a signal emitted by the “spins” of excited nuclei in the tissue as well as encoding spin motion into the phase of the acquired signal. Then the signal is processed to form an image.

Use of PC MRI in areas with significant fat surrounding vessels presents a unique set of challenges. The magnetic resonance signal of fat is at a different frequency than that of water. As a result, fat signals interfere with neighboring water signals, which leads to spreading of the fat signal away from its actual location in the resulting image. The fat signal also may spread into the water signal, resulting in image artifacts and reducing the diagnostic value of the images.

Solutions for errors in many other types of phase contrast exams have been developed, but limited options are available for reliable fat suppression with phase contrast. The most robust methods currently available require a scan time three times longer than conventional scans to obtain sufficient measurements and temporal resolution. An accurate method to correct for fat chemical shift artifacts in PC MRI which circumvents this requirement of several image reconstructions is needed.

The Invention

UW-Madison researchers have developed an improved method of PC MRI that allows for accurate fat and water signal separation. The method simultaneously performs several measurements of echo-time and velocity encoding so that data is acquired from both an on-resonance water signal and an off-resonance fat signal. A set of images is reconstructed by estimating a common magnitude image and a plurality of phase images from the acquired phase contrast image data. Accurate flow velocity quantification is enabled by accurately separating the fat signal from the water images. The resulting image is created with minimal noise and improved quality.

Applications

- Fat-water signal separation and chemical shift error elimination in PC MRI techniques
- PC MRI in vascular, musculoskeletal and cerebrospinal exams

Key Benefits

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete

- Significantly improves image quality by eliminating artifacts caused by fat and water signal interference
- Enables fat-water separation and chemical shift error elimination with substantially fewer measurements



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850

- Allows incorporation of image constraints such as a varying off-resonance map to further reduce influence of noise

Additional Information

For More Information About the Inventors

- [Kevin Johnson](#)

Tech Fields

- [Medical Imaging : MRI](#)

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

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

OK



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850