



Quantifying Visceral Fat Using MRI

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WARF: P110294US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a fully automated and rapid chemical-shift method to measure dangerous fat tissue within the entire abdominal cavity.

Overview

An excess of visceral adipose tissue (VAT), or fat stored in the abdomen, is known to be a dominant risk factor in developing metabolic syndrome, the not fully understood clustering of metabolic and cardiovascular problems including obesity, type II diabetes and coronary artery disease. The 47 million Americans afflicted with the syndrome face heightened risk of stroke, heart attack and premature death.

Determining both the amount and distribution of VAT is critical to assessing an individual's risk. Current diagnostic imaging technology, however, fails to deliver rapid and quantitative adipose measurements without serious drawbacks. CT scans expose patients to medically unnecessary doses of ionizing radiation while conventional magnetic resonance imaging (MRI) requires hours of manual oversight to distinguish VAT from other tissue and signal noise, a cost-inefficient and error-prone process. External biomarkers like waist circumference and body mass index provide indirect physiological measurements and are susceptible to variability.

To perform direct quantifying constructions of the abdominal region, an improved MRI method capable of automatically segregating and calculating VAT within a clinically useful scan and processing time is needed.

The Invention

UW–Madison researchers have developed a new ‘chemical-shift’ imaging technique that distinguishes visceral adipose tissue, measuring the ratio of that tissue to total fat (VTR) of the abdomen and pelvic region, with a single 26-second high-resolution acquisition requiring less than 15 minutes of processing.

By analyzing the difference in resonance frequency between fat, water and fat-fraction, the method rapidly separates the targeted tissue from other material, automatically excluding from measurement air cavities and background noise.

The fat-concentration map that is produced from signal analysis provides an adipose ‘mask,’ or refined representation of all fat tissues, from which a quantitative metric of adipose volume can be determined. An adipose threshold value allows each image pixel to be counted as VAT or non-VAT, calculating the patient's adipose distribution as a ratio over total fat content.

Applications

- MRI software for clinical assessment

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Key Benefits

- Near-isotropic, high-resolution data

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- Truly quantitative adipose mapping
- Automated background noise removal
- Rapid calculation of VAT
- Complete anatomical coverage of abdomen and pelvis

Additional Information

For More Information About the Inventors

- [Scott Reeder](#)

Related Technologies

- [WARF reference number P090389US01 describes an improved method to reduce water-fat signal separation in MRI.](#)

Tech Fields

- [Medical Imaging : MRI](#)

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

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