Medical Imaging

Fat- and Iron-Corrected T1 Mapping for Diagnosing Liver Disease

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to better estimate liver fat content based on a single MR data acquisition and breath-hold. The method performs simultaneous estimates of water and fat signals, as well as TI and T2*.

Overview

Improved MRI methods are needed to diagnose nonalcoholic fatty liver disease (NAFLD), the most common cause of liver disease in the Western world. Promising studies have demonstrated the utility of TI mapping as a biomarker of liver inflammation. However, there are several confounding factors, including the presence of iron. Iron overload is known to occur in diffuse liver disease and makes it difficult to quantify the effects of inflammation on TI.

To date, methods to correct for the effects of iron in the liver require the patient to endure lengthy scans. In addition, the presence of fat, which is common in many patients, particularly those with NAFLD and other forms of chronic liver disease, will also confound TI measurements.

The Invention

UW–Madison researchers have developed a confounder-corrected MR method for evaluating liver fat content. In the new method, multiple datasets with different TI weighting are generated using variable repetition time (TR; sequential or interleaved) and/or multiple flip angles. By acquiring multiple datasets with differential TI weighting, as well as multiple echoes, TI maps can be generated that are both fat- and iron-corrected.

This approach can be performed as a single acquisition and therefore the underlying source data are all inherently co-registered with one another. That is, **simultaneously produced and co-registered estimations of TI (water and fat signals), R2* and proton density fat fraction (PDFF) are now clinically available for the first time**. This allows for the ready creation of fat- and iron-corrected TI and R2* maps.

The method yields other clinically valuable information, such as estimating tissue fat or tissue water concentration in the form of PDFF or proton density water fraction (PDWF). PDFF is a well validated biomarker of liver fat content and PDWF is a biomarker of breast density, which is known to confer increased risk of future breast cancer.

Applications

- Clinical uses include estimation of TI, T2* and PDFF in the liver and other organs (pancreas, heart, muscle) where these biomarkers can be used to assess a variety of disease processes.

Key Benefits

- Satisfies major unmet need
- Enables the ready creation of fat- and iron-corrected TI/R2* maps
- Reduces scan time

Additional Information

For More Information About the Inventors

- Scott Reeder
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Related Technologies

- Finder more MRI innovations developed by Prof. Scott Reeder.

Tech Fields

- Medical Imaging : MRI

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