

MRI Imaging Based on Quantitative Ultrashort Echo Time Imaging of Short T2 Tissues

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BACKGROUND

Historically, molecular resonance imaging (MRI) has provided little or no signal for short transverse relaxation time (T2) tissues in the musculoskeletal system. Copyright/software provides a means to quantitatively measure the relaxation time for other tissues that have been difficult to image and may provide a means to assess change in structure and composition of the collagen matrix.

TECHNOLOGY DESCRIPTION

This method uses quantitative imaging techniques to measure magnetic resonance relaxation time. Specifically, the invention combines 2D and 3D, ultrashort, echo time (TE) sequences with appropriate pulses and can be further combined with efficient long T2 suppression pulses to increase the short T2 contrast and reduce long T2 contamination in T2, T2*, T1p, and T1 quantification.

APPLICATIONS

This new technique allows the evaluation of previously inaccessible MR relaxation times of the short T2 tissues in both 2D and 3D format. Tissues of particular relevance include bone, ligaments, menisci, tendons, enthuses, and calcified cartilage.

ADVANTAGES

This approach simultaneously enables more accurate quantitation and reduces long T2 contamination (2D UTE only) of MR relaxation times.

STATE OF DEVELOPMENT

Validated using phantoms, with Achilles tendons, patellar slices, ankle and knee preps of cadavers, and also validated for knee and “cortical bone” of a healthy volunteer.

INTELLECTUAL PROPERTY INFO

Copyright/software available.

RELATED MATERIALS

- Du J, et. al., Imaging of the Deep Radial and Calcified Layers of the Cartilage Using Ultrashort TE (UTE) Sequence at 3T. Proceedings of the 15th Annual Meeting of ISMRM, Berlin, Germany, 2007, p3813.
- Du J, et. al., Ultrashort TE Spectroscopic Imaging (UTESI) of Cortical Bone. Magn. Reson. Med. 2007; 58:1001-1009.
- Eckstein F, et. al. Quantitative MRI of Cartilage and Bone: Degenerative Changes in Osteoarthritis. NMR in Biomedicine 2006; 19:822-854.
- http://radiology.ucsd.edu/faculty_staff/jdu.html

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Ultrashort Echo Time (UTE) Spectroscopic Imaging of Tissues with Short Transverse Relaxation Time (T2)

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OTHER INFORMATION

KEYWORDS

MRI, molecular resonance, imaging,

bone, ligaments, meniscus, tendons,

enthuses, calcified, cartilage,

collagen, matrix, transverse relaxation
time, T2, tissues, musculoskeletal,

ultrashort, echo time

CATEGORIZED AS

- **Imaging**
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