A Novel Approach for Lower Energy Dynamic Cardiac Cine Imaging With MRI

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SUMMARY

UCLA researchers have developed a novel technique for lower energy deposition or higher contrast dynamic cardiac cine magnetic resonance imaging (MRI). The technology can be used for imaging patients with implanted devices; or imaging at higher field strength (≥3T) to reduce the deposited energy; or improving image contrast at 1.5T.

BACKGROUND

Cardiac cine MRI is routinely used clinically for evaluating cardiac function. Cardiac cine imaging at higher field strength (≥3T) with the conventional balanced steady-state free precession technique is challenging due to the increased energy deposition (i.e. SAR) and increased artifacts. Energy deposition rules and regulations also limit other MRI applications. For example, the increased energy deposition is a concern for imaging patients with implanted devices even at 1.5T as this can lead to tissue heating and tissue damage. Previous methods have been able to reduce the deposited energy for various applications, but not for cardiac cine imaging. The new technique will enable cardiac cine imaging at high field strength with lower energy deposition.

INNOVATION

Dr. Daniel Ennis and colleagues in UCLA's Department of Radiological Sciences have developed a novel MRI protocol that allows 2D and 3D cardiac CINE imaging with lower energy deposition. The unique scheme maintains or improves the blood-myocardium contrast while reducing the energy deposition by at least 36%. Computer simulations and tests in humans have demonstrated that the new scheme can be also be used to produce images with higher blood myocardium contrast.

APPLICATIONS

- Cardiovascular cine magnetic resonance imaging

ADVANTAGES

- High-contrast cardiac cine imaging
- Reduced specific absorption rate (SAR): reduction by 36% or more.
- Safer imaging of patients with implanted devices

STATE OF DEVELOPMENT

This technique has been programmed on scanners and the reconstruction is currently done offline using MATLAB. The technique has been tested in 10 normal subjects.

RELATED MATERIALS

- Variable flip angle balanced steady-state free precession for lower SAR or higher contrast cardiac cine imaging. Magn Reson Med. (2013)

PATENT STATUS

Country	Type	Number	Dated	Case

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OTHER INFORMATION

KEYWORDS

imaging, magnetic resonance imaging, MRI, 3 Tesla, 3T, Cardiac cine imaging, specific absorption rate, SAR, flip angle, a, 2D imaging, 3D imaging, image acquisition, pulse protocol, steady-state free precession, SSFP, balanced steady-state free precession, bSSFP, radiofrequency, UCLA Radiology

CATEGORIZED AS

- **Imaging**
  - Medical
- **Medical**
  - Imaging

RELATED CASES

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