

## DIFFERENTIATED TISSUE EXCITATION IN MRI

*The suppression of fat signals is an important component of many magnetic resonance imaging (MRI) exams in the clinic. Signals from fat need to be suppressed to obtain high quality images.*

### DESCRIPTION

The invention provides a method for the differentiation of tissue in MRI by using a new type of binomial radio frequency (RF) excitation called LIBRE that specifically excites the water protons and efficiently suppresses lipid signals. (Abbreviated LIBRE for Lipid Insensitive Binomial off-Resonant Excitation).

### COMPETITIVE ADVANTAGES

- Broad suppression bandwidth resulting in enhanced efficiency of suppression.
- Significantly reduces the bright fat signals in MRI exams.
- Increases the detectability of pathology.
- Robust to magnetic field inhomogeneities.
- Low specific absorption rate (SAR).
- Provides near complete fat suppression in large volumes, even in 3D radial acquisitions.
- Particularly benefits applications at high magnetic field strength.

### APPLICATIONS

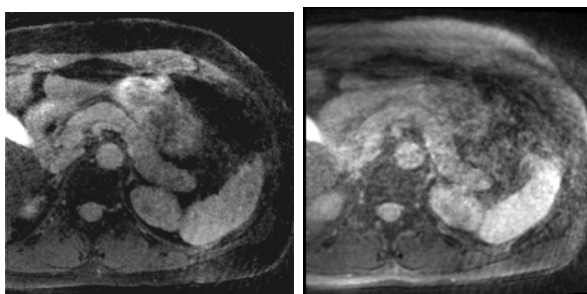
- As an RF pulse in any type of MRI acquisition.
- To replace any RF pulse, such as RF excitation pulses, RF pulses in magnetization preparation modules, and for example RF pulses that are used as navigators.
- To enable and improve motion compensation methods that are challenged by fat signal.
- For high resolution quantitative imaging of cartilage (T2mapping) e.g.

### REFERENCE

IDF 35/15

### TYPICAL RESULTS:

#### Abdominal imaging



LIBRE

Conventional

### INTELLECTUAL PROPERTY

Patent applications: EP 16165763.0 and US 15/487,542 pending  
Publication N°: EP3236277, US-2017 0299678  
Priority date: April 18, 2016  
Applicant: Lausanne University Hospital  
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### STAGE OF DEVELOPMENT

Significant clinical validation has been performed at CHUV on 33 cardiac patients. MR angiography and high resolution cartilage imaging has also successfully been performed in patients.

### Key Publications:

**JAM Bastiaansen, M Stuber.** Flexible water excitation for fat-free MRI at 3 Tesla using lipid insensitive binomial off-resonant RF excitation (LIBRE) pulses. *Magn Reson. Med* (2017) [IF 3.8]  
**R Colotti, P Omoumi, RB van Heeswijk, JAM Bastiaansen.** Simultaneous Fat-Free Isotropic 3D Anatomical Imaging and T2 Mapping of Knee Cartilage with Lipid Insensitive Binomial Off-Resonant RF Excitation (LIBRE) Pulses. *J Magn Reson Imaging* 2018, In Press.

### COLLABORATION OFFER

PACTT is looking for industrial partners for further development and offers to grant non-exclusive patent licenses.