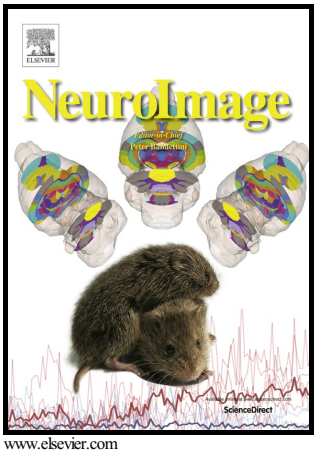
Ultra-high resolution brain metabolite mapping at 7 T by short-TR Hadamard-encoded FID-MRSI

Gilbert Hangel, Bernhard Strasser, Michal Považan, Eva Heckova, Lukas Hingerl, Roland Boubela, Stephan Gruber, Siegfried Trattnig, Wolfgang Bogner



www.elsevier.com

PII: S1053-8119(16)30601-2
DOI: http://dx.doi.org/10.1016/j.neuroimage.2016.10.043
Reference: YNIMG13540

To appear in: *NeuroImage*

Received date: 30 June 2016
Revised date: 24 October 2016
Accepted date: 26 October 2016

Cite this article as: Gilbert Hangel, Bernhard Strasser, Michal Považan, Ev Heckova, Lukas Hingerl, Roland Boubela, Stephan Gruber, Siegfried Trattnig and Wolfgang Bogner, Ultra-high resolution brain metabolite mapping at 7 T by short-TR Hadamard-encoded FID-MRSI, *NeuroImage* http://dx.doi.org/10.1016/j.neuroimage.2016.10.043

Ultra-high resolution brain metabolite mapping at 7 T by short-TR Hadamard-encoded FID-MRSI

Gilbert Hangel[a], Bernhard Strasser[a], Michal Považan[b], Eva Heckova[a], Lukas Hingerl[a], Roland Boubela[a], Stephan Gruber[a], Siegfried Trattnig[b], Wolfgang Bogner[a*]

[a]High Field MR Centre, Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna

[b]High Field MR Centre, Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna; Christian Doppler Laboratory for Clinical Molecular MR Imaging

[*]Corresponding author. Lazarettgasse 14, 1090 Wien, Vienna, Austria. Tel: +431/40400/64710, Fax: +431/40400/64750. wolfgang.bogner@meduniwien.ac.at

Abstract

MRSI in the brain at ≥7 T is a technique of great promise, but has been limited mainly by low B_0/B_1^+-homogeneity, specific absorption rate restrictions, long measurement times, and low spatial resolution. To overcome these limitations, we propose an ultra-high resolution (UHR) MRSI sequence that provides a 128×128 matrix with a nominal voxel volume of 1.7×1.7×8 mm³ in a comparatively short measurement time. A clinically feasible scan time of 10-20 min is reached via a short TR of 200 ms due to an optimised free induction decay-based acquisition with shortened water suppression as well as parallel imaging (PI) using Controlled Aliasing In Parallel Imaging Results IN Higher Acceleration (CAIPIRINHA). This approach is not limited to a rectangular region of interest in the centre of the brain, but also covers cortical brain regions. Transversal pulse-cascaded Hadamard encoding was able to further extend the coverage to 3D-UHR-MRSI of four slices (100×100×4 matrix size), with a measurement time of