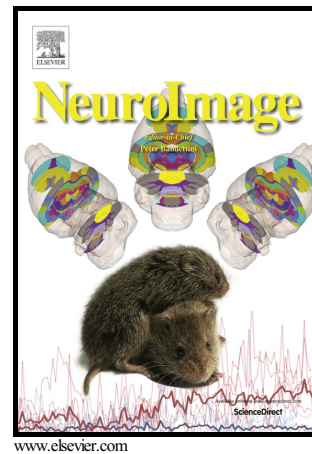


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Ultra-high resolution brain metabolite mapping at 7 T by short-TR Hadamard-encoded FID-MRSI

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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 $1.7 \times 1.7 \times 8$ 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 ($100 \times 100 \times 4$ matrix size), with a measurement time of

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