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A scanner noise impact on functional Magnetic Resonance Imaging studies

Bogorodzki, P. (1, 2), Piatkowska-Janko, E. (2), Wolak, T. (2), Sliwa, L. (1), Kochanek, K. (1), Orzechowski, M. (2), Kurjata, R. (2), Golebiowski, M. (3), Skarzynski, H. (1)

- (1) Institute of Physiology and Pathology of Hearing in Warsaw
- (2) Institute of Radioelectronics, Warsaw University of Technology
- (3) 1st Dept. of Clinical Radiology, Medical University of Warsaw

The aim of the study was to measure the level of impact of the Echo Planar Imaging (EPI) sequence noise on BOLD response in auditory cortex area.

For each of the 20 healthy subjects at age 23.6 ± 0.7 four functional 'runs' were acquired with variable TR and block type acoustic stimuli with (/ka/, /ta/, /pa/, /ga/, /da/, /ba/) syllables in 30s length 'on' periods. In order to detect linear dependence of activation volume in dependence of TR a linear model was applied giving two regression parameters for each hemisphere.

Activation was detected in both hemispheres for all functional runs. The mean activation size averaged across the runs was 32 and 25 cm³ for left and right hemisphere respectively. Pair-wise comparisons between groups TR2-TR3, TR2-TR4, TR2-TR6 did not show any differences on the $\alpha=0.05$ level.

The presented work revealed a single percent range dependence of activation size in dependence from varying amount of noise in stimulating paradigm. The linear relation was rejected suggesting nonlinear relation between mentioned variables. A region of interest based approach may allow more quantitative or semi-quantitative analysis of functional activations.

