

Abstract

Title: Brain Activity Changes During Walking Affected by Cueing in Parkinson's Disease Patients Viewed by sLORETA Imaging.

Objectives: The aim of this diploma thesis is to ascertain changes in electrical activity of the brain, evaluated by sLORETA program, between gait affected by visual and auditory cueing and normal comfortable gait in patients with Parkinson's disease.

Methods: This experiment was conducted on 11 patients with Parkinson's Disease aged between 60–78 years. The electrical activity of the brain was registered by scalp EEG during the whole experiment. The experiment consisted of 4 parts. In the beginning we measured resting EEG with closed and then opened eyes (5 + 5 minutes), after that we measured EEG during normal comfortable gait on 3 meters long track (3 minutes). Subsequently we measured EEG during walking affected by cueing, again on the 3 meters long track (3 + 3 minutes). The order of visual and auditory cueing was randomized. Visual cueing was mediated by white lines (tapes) stuck to the floor within 50 centimetres of each other. Auditory cueing was mediated by a metronome. The basic rhythm of the metronome was set on the 70 BPM. Next, the data from the experiment were transferred into the sLORETA program, which enabled statistical processing and also imaging of the active parts of brain on the 3D Talairach cortical atlas. For the evaluation of statistically significant changes in the brain activity, a pairwise t-test with logarithmic transformation of the aliasing parameter 0,2 with permutation method using 5000 randomizations was used.

Results: A statistically significant difference in the brain activity was revealed between gait affected by visual cueing and normal gait in the Brodmann's areas 9,10 and 32 in the beta-3 frequency band at the significance level $p \leq 0,05$. Between gait affected by auditory cueing and normal gait there was no statistically significant brain activity change.

Keywords: Parkinson's Disease, cueing, sLORETA, EEG, Brodmann's area