

Effects of adaptive deep brain stimulation on attention in patients with Parkinson's disease

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Introduction: Adaptive Deep Brain Stimulation (aDBS) is a recent development of DBS in which the stimulation is modulated according to the clinical state of the patients [1].

However, before aDBS comes into clinical practice it is necessary to prove its safety and efficacy.

Objectives: The main objective of this study is to assess the side effects of aDBS on attentive functions using a simple reaction times task (RTs) during an 8-hours session also considering effects of levodopa medication.

Methods: 16 patients with PD [(mean±SD) age 58±8; UPDRS 31 ± 9; 4 Female] implanted with electrodes in the bilateral STN were enrolled in the study. The experiment was conducted 6 days after surgery and patients were stimulated with an external aDBS device. Patients were evaluated with a simple RTs task four times throughout the 8 hours in correspondence to "on aDBS-on medication" condition (T0, T2) and to "on aDBS-off medication" condition (T1, T3). We calculated mean RTs between T0 and T2 (on-on condition) and between T1 and T3 (on-off condition) to compare the effects of aDBS when medication was in on VS off state.

Results: Paired sample T-tests showed no RTs differences between the mean RTs in 'on-on' conditions and RTs in 'on-off' conditions $t(16) = -1,34$ $p = 0,198$. [on-on Mean ± S.D. VS on-off Mean ± S.D. (456,06 ± 93,84; 479,78 ± 129,35)]

Conclusions: RTs are a reliable method to assess the effectiveness of DBS [2], to date no difference between conventional DBS and aDBS in RTs has been found in parkinsonian monkeys [3].

In our study, we showed that the pharmacological off-state had no effects in slowing RTs when aDBS was on, suggesting that aDBS could be effective even during pharmacological off-state without psychomotor or attention side effects.

References:

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