Combination of a computerized cognitive training (CoRe System) with transcranial direct current continuous stimulation (tDCS): what effects in Alzheimer's dementia?

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Background: Alzheimer's disease (AD) is the most frequent cause of dementia. To date, there is no fully proven pharmacological treatment for cognitive impairment and the available pharmacological armamentarium has limited efficacy. Therefore, non-pharmacological intervention may represent adjunctive therapy to medications in order to delay the evolution of the cognitive deficits.
This study aims to evaluate the effectiveness of a combined treatment associating a computerized cognitive training (CoRe) with non-invasive brain stimulation techniques (transcranial direct current stimulation - tDCS).

Methods: Patients with mild AD were enrolled and randomized to receive CoRe plus anodic tDCS (EG - experimental group) or CoRe plus sham tDCS (CG - control group). The treatment protocol consisted of 12 sessions of CoRe training combined with on-line tDCS applied to the dorso-lateral prefrontal cortex. All patients were evaluated before (T0) and after (T1) treatment with an exhaustive neuropsychological assessment. Furthermore, follow-up visits were scheduled 6 months (T2) after the end of the treatment. At T0, the cognitive reserve was assessed using Cognitive Reserve Index questionnaire (CRIq).

Results: For what concerns neuropsychological tests, when comparing T0 vs T1, CG improved only in one attentive test, while EG improved in more executive tests. During the training, both groups improved their performance at CoRe tasks, but this improvement was higher in EG. After 6 months (T1 vs T2) no post-training improvement was maintained in both groups. With respect to T0 (T0 vs T2), cognitive profile was stable in both groups compared to the baseline.

Conclusions: These preliminary data suggest that this combined treatment has a slightly higher rehabilitative efficacy, especially on some aspects of executive functions. Follow-up visits allow to assess whether this combined treatment affects the evolution of cognitive decline. The presence of a higher cognitive reserve seems to have a positive impact on the cognitive training performance.