

**Abstract:**

**Introduction:** To explore and develop effective treatments is crucial for patients with Alzheimer's dementia (AD). In pathology, the amyloid deposits of AD result in disruption of the balance between long-term potentiation (LTP) and long-term depression (LTD) of neuronal cells and synaptic plasticity. Transcranial direct current stimulation (tDCS) has been proposed to affect long-term synaptic plasticity through LTP and LTD, thereby improving cognitive ability. Although an increasing number of studies have been concluded a positive therapeutic effect on cognition in AD, tDCS studies to date are limited on exploring the duration of its efficacy. In this pilot study, we investigate the effects of tDCS in AD and verify its extending beneficial effects for 3 months follow-up period after the end of stimulation.

**Method:** 34 AD participants aged 55-90 years (mean age 75.9 (66-86)) were included in a double-blind, randomized, sham-controlled crossover study. All participants were randomly assigned to receive 10 consecutive daily sessions of active tDCS (or sham) and switched groups 3 months later. The anodal electrode was on the left dorsal lateral prefrontal cortex and the cathodal electrode was on the right supraorbital area. In each active session, we applied a current intensity of 2 mA and an electrode size of 25 cm<sup>2</sup> for 30 min in the active group. All subjects received a series of neuropsychological assessments including CDR, MMSE, CASI and WCST at baseline and in 2 weeks, 4 weeks, and 12 weeks post-tDCS (or sham) 10 sessions. Chi-square tests, Wilcoxon signed rank tests and Mann-Whitney U tests were used to assess the differences in participant demographic characteristics and to compare the differences of test scores between groups.

**Results:** The active tDCS group showed significant improvements on CASI total scores from baseline to 2-weeks, 1-month and 3-months after active stimulations, though the improvement declined over time. There are also different presentations in total correct items, conceptual level responses, failure to maintain sets of WCST between active tDCS and sham groups. There is no difference in MMSE, CASI and WCST scores in the sham groups.

**Conclusion:** These results suggest a long term-beneficial effects of tDCS in AD.

Key words: Transcranial Direct Current Stimulation, Alzheimer's dementia, cognitive function, Wisconsin Card Sorting Test

**419 - Effect of Transcranial Direct Current Stimulation (tDCS) in Dementia with Lewy Bodies**

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**Abstract:**

**Introduction:** Dementia with Lewy Bodies (DLB), this second most common form of degenerative dementia, presents more functional disability, more potentially fatal complication, more impaired quality of life than Alzheimer's dementia. There is no FDA-proved medication can slow, stop or improve the progression of cognitive declines in DLB. Identifying effective treatments is a critical issue for DLB. In neuropathology, extracellular  $\alpha$ -syn oligomers interfere with the expression of long-term potentiation, and influence memory and learning. Transcranial direct current stimulation (tDCS) has been proposed to affect long-term synaptic plasticity through LTP and LTD, thereby improving

cognitive ability. So far, only two researches assess the effect of tDCS in DLB. In this pilot study, we investigate the effects of tDCS in DLB.

**Method:** Using a double-blind, randomized, sham- controlled and crossover trial design, 11 DLB aged 55-90 years (mean age 77.8) were included in the study. DLB diagnostics is according to DSM-5 criteria. The CDR ratings of DLB participants ranged from 0.5 to 2. The active tDCS (or sham) process includes consecutive daily sessions of active tDCS (or sham) for 10 days. The anodal electrode was over the left dorsal lateral prefrontal cortex (DLPFC) and the cathodal electrode on the right supraorbital area. In each session, we applied a current intensity of 2 mA and an electrode size of 25 cm<sup>2</sup> for 30 min in the active group. All subjects received a series of neuropsychological tests, which included CDR, MMSE, CASI, NPI and WCST, before and after these treatment sessions. Chi-square tests, Wilcoxon signed rank tests and Mann-Whitney U tests were used to assess the differences in participant demographic characteristics and to compare the differences among groups.

**Results:** On CASI, MMSE, NPI and WCST, there were no statistically significant differences between pre- and post the 10-session course for the active and the sham groups. No side effects reported during or immediately after active tDCS stimulation.

**Conclusion:** These results suggest that left DLPFC anodal, and right deltoid cathodal tDCS, do not improve cognition, behavioral and psychological symptoms in DLB. Larger-scale trials are needed to confirm the effect of tDCS in DLB.

Key words: Transcranial Direct Current Stimulation, Dementia with Lewy Bodies, cognitive function, Wisconsin Card Sorting Test

#### **420 - Ketamine treatment in geriatric depression**

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Treatment resistant depression can be very disabling and has a significant negative impact on a patient, their family or caregivers, and the society. There is a growing evidence on the efficacy and safety of ketamine for treatment resistant depression. Ketamine is a racemate consisting of esketamine and arketamine, is an N-methyl D-aspartate receptor antagonist and comes in different formulations and in fact intranasal ketamine is FDA-approved in the US. Despite the existing evidence and FDA approval for treatment resistant depression, data on older individuals remains limited. Late life depression especially those that are treatment resistant can be very disabling, with significant functional and cognitive impairments, increased morbidity and mortality, and the psychosocial burdens.

This presentation describes outcomes for 2 cases of older individuals with treatment resistant depression who were treated with intranasal ketamine. One improved, and one did not. The scarce available literature of the use of ketamine in the geriatric population shows ketamine is well tolerated and effective. Remission rates in 3 separate show remission rates of 46.5%, 57% and 69.5% respectively. The discussion will include a review of the mechanism of action of ketamine as a novel antidepressant, the mixed evidence for its role in treatment resistant late life depression, and the practical and operational aspects relevant to running a ketamine clinic.