Sooma tDCS™ for research use

A review of the research on several clinical indications of tDCS

Transcranial direct current stimulation (tDCS) is a light and easily administered neuromodulation method that can be used as a potential treatment option for various clinical conditions. This guide introduces the current evidence and background information of the investigational use of tDCS for several clinical conditions including:

1. Addiction, Cravings and substance abuse
2. Schizophrenia
3. Migraine
4. Motor stroke rehabilitation
5. Fibromyalgia and other chronic pain conditions
6. Epilepsy
7. Parkinson's disease
8. Alzheimer's disease

General overview of Sooma tDCS™

A small and lightweight device, designed for clinical routine!

Sooma tDCS™ is a class IIa medical device. A weak electric current (1-2 mA) is applied to the scalp through two surface electrodes. The electrodes can be positioned with the help of indication specific head caps or plastic straps.

Starting a Sooma tDCS™ treatment session is straightforward. The Sooma tDCS™ device has a single control button. There is no possibility to modify the function of the device by accident. Stimulation can be used as a monotherapy or in addition to the patient's current treatment modality.

Contraindications for the use of Sooma tDCS™: intracranial metal components in the head area (excluding dental implants), cardiac pacemaker and acute eczema of the skin under the electrodes. There are only limited data available for pregnancy. Use during pregnancy is not recommended.

Safety

tDCS is painless and well tolerated. It is not associated with serious adverse events or withdrawal effects. Itching under the electrodes and mild headache are relatively common but harmless symptoms of tDCS treatment. It is safe to use for adults, adolescents, children over 7 years and elderly people. (Bikson et al. 2016, Brunoni et al. 2011)

Use in home environment

Many of the clinical conditions treated with neuromodulation methods such as tDCS are characterized as chronic. In such cases, home-based treatment that allows taking the treatment as required in a timely manner is beneficial. Therefore, Sooma offers a tDCS system that is fully compatible for home use. The safety of self-administered treatment with Sooma tDCS™ has been confirmed clinically (Hyvärinen et al. 2016).

The first session should always be done under the supervision of a professional. During this session, the patient's ability to perform self-administered stimulation is assessed. After the first session, the patient can take the device home and continue daily or weekly treatments in the home environment.

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Summary of the tDCS protocols

Indication	Headcap	Electrodes	Sponges	Session duration	Number of sessions
Depression	SCx2	ELM2	SPM2	30 min	min 10
Bipolar depression	SCx2	ELM2	SPM2	30 min	min 10
Crawings	SCx2 (reverse electrode positions)	ELM2	SPM2	20 min	min 5
Schizophrenia	SCx2	ELM2	SPM2	20 min	min 10
Migraine	RS5520	ELM2	SPM2	20 min	min 3 / week for 3 weeks
Motor stroke rehabilitation	HM3x	ELM2	SPM2	20 min	min 10
Fibromyalgia	HM3x	ELM2	SPM2	20 min	min 10
Neuropathic pain after SPI	HM3x	ELM2	SPM2	20 min	min 10
Epilepsy	RS5520	ELM2	SPM2	20 min	min. 5
Parkinson's disease	HM3x	ELM2	SPM2	20 min	min 5
Alzheimer's disease	RS5520 + FS40	ELM2	SPM2	20 min	min. 10

Addiction, cravings and substance abuse

Introduction

Addiction disorders are major clinical challenges. Be it alcohol, nicotine, cocaine, or food, continued misuse can lead to a significant long-term complications. Achieving permanent relief is difficult due to poor treatment compliance and high recurrence rates.

Regardless of the substance, the addiction causes significant problems and distress. The main symptoms include compulsive consumption of the substance, impaired ability to control the initiation and termination of the substance use, developed substance tolerance, withdrawal symptoms, and continued usage despite the undesirable disadvantages.

There are several measures of addiction severity. Addiction can be diagnosed using an ICD-10 or DSM-5 criteria. In addition to diagnosing criteria, the treatment progress can be measured with craving scales designed for each substance separately, quality of life measures, and anxiety-depression scales.

By affecting top-down inhibitory control mechanisms and reward mechanisms, tDCS can be a valuable treatment method in addiction disorders (Goldstain and Volkow 2002, Wilson et al. 2004). tDCS targeting the dorsolateral prefrontal cortex (DLPFC) interrupts the processes leading to cravings by increasing cognitive control to prevent relapse and reducing the activation of reward mechanisms during substance use.

Clinical evidence

Based on clinical evidence, bilateral tDCS of the DLPFC is a promising and probably effective treatment modality for addiction and cravings. There are a number of clinical studies demonstrating positive effects of active tDCS on addictions such as alcohol, cocaine, and smoking. (Lefaucheur et al. 2017)

Furthermore, several clinical studies investigated

the effectiveness of tDCS on addiction and cravings, including 9 studies on alcohol addiction, 14 on smoking cravings, 9 on food cravings and 7 on addiction to other drugs such as cocaine. Most of the clinical studies have used only one single tDCS session, and the majority have shown active tDCS to be superior to sham treatment. Here we present some of the evidence from double-blinded randomized controlled trials (RCT) with study designs comprising more than one tDCS session.

Crack-cocaine

tDCS was found to improve craving scores, anxiety and overall perception of quality of life in crack-cocaine users after active tDCS vs. sham. The decrease in craving scores was linear over 4 weeks as reported in an RCT by Batista et al. (2015).

Alcohol

tDCS treatment did not decrease the craving scores in alcoholics, but the quality of life scores after active tDCS was improved compared to sham tDCS. After 6 months, 8 of 16 alcoholics in the active group were alcohol-abstinent compared to 2 of 17 in the sham group. (Klauss et al. 2014).

Smoking

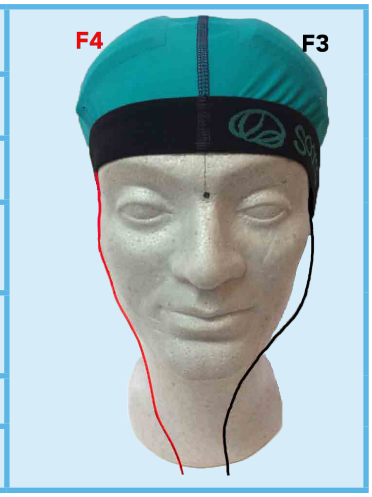
Active tDCS treatment was found to decrease the number of cigarettes smoked more than sham tDCS after a one-week intervention. In addition, tDCS reduced craving for cue-provoked smoking and smokers rejected offers of cigarettes more often (Boggio et al. 2009 and Fecteau et al. 2014). The effect lasted up to 4 days after intervention (Fecteau et al. 2014).

Food

There is a limited evidence of tDCS effects on food cravings, so no specific recommendations can be made at this time. For example, tDCS has been found to improve craving scores for sweet food, but not for savory food (Kekic et al. 2014).

Sooma's solution

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 on consecutive weekdays (min. 1 week)
Montage	anode on the right DLPFC (F4) cathode on the left DLPFC (F3)
Cap model	Sooma Smart Cap (SCS2, SCM2, SCL2) or Sooma Head Cap (HC2S/M/L)
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2



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Schizophrenia

Introduction

Schizophrenia is a psychiatric disease affecting the subject's thinking, feeling and behaviour. Typical symptoms can be classified into three categories: positive, negative and cognitive symptoms. Positive symptoms include auditory and visual hallucinations and dysfunctions in thinking while negative symptoms are associated with emotional and behavioral abnormalities. Cognitive symptoms comprise e.g. troubles in focusing and processing information (working memory).

The progress of the different symptoms of schizophrenia can be assessed with AHRS (auditory hallucinations rating scale) for auditory hallucinations, a frequency of AVH (auditory verbal hallucination), PANSS (positive and negative symptoms scale) for positive and negative symptoms and SANS (scale for the assessment of negative symptoms) for negative symptoms.

The most frequent drug-resistant symptoms are auditory verbal hallucinations and negative symptoms, which are both related to reduced brain activity in the DLPFC and hyperactivity in the left temporo-parietal region. Thus, it is hypothesized that anodal tDCS over the left DLPFC with the cathode over the left temporo-parietal junction should alleviate the AVH symptoms, and bilateral tDCS over DLPFC with the anode on the left and the cathode on the right should alleviate negative symptoms accordingly.

Clinical evidence

At least 25 clinical studies (excluding case reports) have investigated the effects of tDCS on schizophrenia, using several electrode montages, stimulation durations and number of sessions. Seven of those were RCTs including at least 10 patients.

One double-blind, sham-controlled RCT demonstrated significant improvement in AVHs after active tDCS vs. sham (mean AHRS reduction -31% vs. -8%) using a montage with the cathode on the left temporo-parietal junction and the anode on the left DLPFC (Brunelin et al. 2012). With the same electrode montage, AVH frequency has also been reported to be reduced more after active compared to sham intervention (mean -46% vs 7.5%) (Mondino et al. 2015). Greater AVH reduction has been found to correlate with a reduction of functional connectivity between the left temporo-parietal junction and anterior insula (Mondino et al. 2016).

However, two studies reported no difference in AVH (Fröhlich et al. 2016) or any schizophrenia symptoms (Fitzgerald et al. 2014) after active vs. sham tDCS intervention. Two studies used a different electrode montage: the anode placed over the left DLPFC and the cathode placed over the right supraorbital region (RSO). Using this electrode montage, tDCS has been found to improve cognitive functions such as working memory and attention-vigilance scores, but with no changes in PANSS scores (Smith et al. 2015). In contrast, Palm et al. (2016) reported a reduction of SANS and PANSS scores after active vs. sham tDCS.

A recent review states that tDCS is a promising therapeutic approach for auditory hallucinations in schizophrenia patients, while pointing out that large RCTs are expected to strengthen the body of the positive results. (Ponde et al. 2017)

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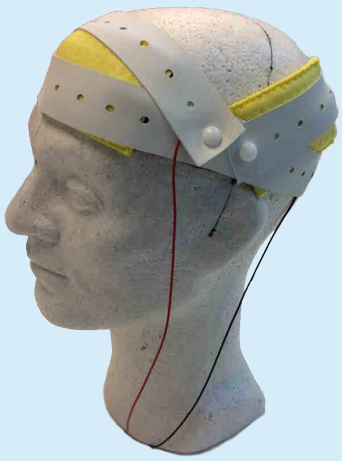
Smith RC, et al. Effects of transcranial direct current stimulation (tDCS) on cognition, symptoms, and smoking in schizophrenia: a randomized controlled study. Schizophr Res 2015;168:260–6.

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in schizophrenia:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 on consecutive weekdays (2-3 weeks)
Montage	anode on the left DLPFC (F3) cathode on the left temporo-parietal junction (between T3 and P3)
Cap model	Sooma rubber straps, (RS5520).
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2



Migraine

Introduction

Chronic and episodic migraine impacts patients functioning and perception of quality of life. The prevalence of migraine in the general population is 1-5% (Natoli et al. 2009). Both types of migraine can be treated with acute or prophylactic medication. Especially in chronic migraine, cognitive behavioral therapy, biofeedback, and relaxation techniques can be applied to achieve improvement in symptoms. Recent neurostimulation studies have demonstrated promising results in migraine. The new treatment options provide greater chance to achieve successful treatment results without undesired side effects commonly related to pharmacological painkillers. (Cho et al. 2017)

The severity of a migraine can be assessed with the following measures: headache duration, pain intensity, attack frequency, number of migraine days, amount of medication per day and quality of life.

In migraine, tDCS is hypothesized to decrease V1 oversensitivity or increased responsiveness at the origin of the headache by positioning the cathode over V1 (Antal et al. 2011). Generally, in various pain conditions, the cathode is positioned over the primary motor cortex (M1), and the anode is positioned over the dominant hemisphere or contralateral to the side of the pain. This is proposed to have analgesic effects by modulating sensory and emotional components in pain processing. The M1 montage has also been applied successfully in a migraine.

Clinical evidence

Seven RCTs have investigated the effect of tDCS on migraine. The first positive results were reported using cathodal V1 stimulation, with the anode positioned on the primary motor cortex (Antal et al. 2011). Active tDCS was shown to reduce the duration of the attacks, intensity, and number of migraine days.

With the same montage, two later studies demonstrated decreases in the number of attacks, but the difference between active and sham tDCS was not significant (Rocha et al. 2015 and Wickmann et al. 2015).

Two studies have reported positive results such as a decrease in episode length, pain intensity and frequency of attacks with anodal tDCS of M1 (Auvichayapat et al. 2011 and Dasilva et al. 2012).

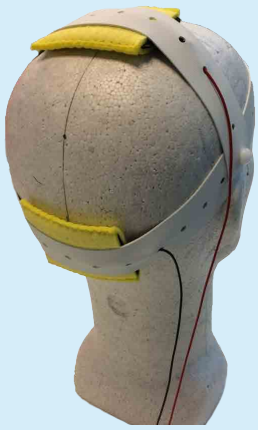
A meta-analysis by Shirahige et al. (2016) concluded that tDCS has moderate to high effect on pain control based on four RCTs and 95 patients.

- Pain intensity - SMD: -0.91; 95% CI: -1.79 to -0.03; P=.04
- Migraine attacks - SMD: -0.75; 95% CI: -1.25 to -0.24; P=.004
- Painkiller intake - SMD: -0.64; 95% CI: -1.21 to -0.07; P=.03

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in migraine:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	3 on consecutive weekdays 3 weeks
Montage	cathode on the visual cortex (Oz) anode on the central motor cortex (Cz).
Cap model	Sooma rubber straps, (RS5520).
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2



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Fibromyalgia and other chronic pain conditions

Introduction

Fibromyalgia is a chronic neuropathic pain syndrome, which affects muscle and soft tissue. Symptoms include muscle pain, fatigue, painful tender points on the body and mood issues, which can be relieved with medication, lifestyle changes, and stress management. However, achieving a long-lasting cure is difficult with current treatment options.

The evidence in chronic pain conditions is promising and even convincing in fibromyalgia. Currently, the majority of literature in pain treatment targets the motor cortex. The anode is positioned over the dominant hemisphere or contralateral to the side of the pain. This is proposed to have analgesic effect by modulating sensory and emotional components in pain processing. Specifically, neural circuits in the precentral gyrus are activated during stimulation.

Current intensity is most often at 2 mA and at least 10 sessions are administered. However, the optimal mode of application and the accurate effect sizes are still fairly unknown. There are further open questions about the effect duration and how the maintenance treatment should be arranged. Maintaining the effect may require considerably longer maintenance treatments than in e.g. depression therapy.

Clinical evidence

Fibromyalgia

The current clinical evidence favors anodal tDCS of the left M1. The evidence-based guideline assessed tDCS to have a probable efficacy on pain caused by fibromyalgia (Lefaucheur et al. 2017). The latest meta-analysis on fibromyalgia was published by Zhu et al. (2017), containing data from 5 RCTs and 192 patients. It concluded pain relief and improvement in fibromyalgia related function after anodal tDCS over M1 at post-treatment compared to baseline (SMD -0.59. [-0.9, -0.27], p=0.0002).

Other pain conditions

The most recent meta-analysis on neuropathic pain after spinal cord injury (SCI) was published by Mehta et al. (2015). It contained 5 RCTs with 83 patients and found that post-treatment VAS for pain was reduced after active tDCS. Post-treatment SMD 0.510 ± 0.202; 95% CI, 0.114–0.906; P<0.012. Lefaucheur also reviewed the literature on SCI related neuropathic pain in the evidence-based guideline and concluded tDCS to be possibly effective in SCI-related neuropathic pain of lower limbs.

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in fibromyalgia and chronic pain conditions:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 on consecutive weekdays, 2-4 weeks
Montage	anode on C3 or C4, contralateral to the pain side or on the dominant hemisphere cathode on the contralateral supraorbital region.
Cap model	HM3S/M/L, turn the cap inside out if targeting right M1 instead of left M1.
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2

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Motor stroke rehabilitation

Introduction

Stroke is a common neurological disease affecting 15 million people per year worldwide (WHO 2014). A majority of strokes are ischemic strokes caused by an interruption of blood flow due to blockage in the vessel, and the rest are hemorrhagic caused by intracranial bleedings. As a consequence, brain tissue in the affected area becomes dysfunctional and neurotic. Some patients recover substantially after a couple of weeks of physical or occupational therapy, but some get permanent neurological deficits often resulting in motor functioning problems. The most of the improvement can be seen after the first 4 weeks post-stroke. (Grefkes and Ward 2014)

tDCS has a potential clinical impact for both acute and chronic stroke therapy. Cortical stimulation aims to promote adaptive neuroplasticity. Thus, tDCS can either increase ipsilesional M1 excitability or decrease contralesional M1 excitability, or both using bilateral tDCS.

Measurable outcomes can be assessed for motor recovery with e.g. the Fugl-Meyer motor scale (FM) and National Institute of Health Stroke Scale (NIHSS), and for general improvement with quality of life scales.

Clinical evidence

Most of the tDCS studies on stroke have targeted the upper limb functioning through stimulation over M1, but also post-stroke swallowing or lower limbs have been objectives. Variations in stimulation parameters (tDCS current intensity, polarity, duration), number of sessions, duration of follow-up and the task performed for outcome evaluation renders the overall picture of tDCS effects complex.

Two large RCTs with 50 or more patients reported no improvement after tDCS treatment (Hesse et al. 2011 and Rossi et al. 2013). One study (Hesse et al. 2011) may have failed to show positive outcome due to the inclusion of patients with cortical stroke and severe motor weakness whose responsiveness to cortical stimulation is known to be low (Ameli et al. 2009). They applied cathodal stimulation of the contralesional M1. Rossi et al. (2013) applied anodal tDCS of the ipsilesional M1 during the immediate acute phase.

In addition to Rossi et al. (2013), there are at least seven RCTs that have used anodal stimulation of the ipsilesional motor cortex, with the anode placed over the ipsilesional M1 and the cathode over the opposite supraorbital region. A meta-analysis conducted for ipsilesional M1 chronic stroke patients concluded that tDCS has a small to moderate effect size on the improvement of upper limb movement (Butler et al. 2013). Pooled analysis favoured anodal tDCS (standard mean difference [SMD] = 0.40, 95% confidence interval [CI] = 0.10–0.70, p = 0.010). The effect was significant compared to sham (SMD = 0.49, 95% CI = 0.18–0.81, p = 0.005).

A recent meta-analysis including 8 RCTs with 213 patients showed a moderate effect on FM scores in chronic stroke patients when using bilateral tDCS over M1. The analysis showed a strong effect size favouring anodal tDCS over sham (Hedge's g = 0.61, p = 0.02). (Chhatbar et al. 2016)

Combining tDCS with other therapies may have synergistic effects. E.g. virtual reality training (Lee and Chun 2014), occupational therapy (Nair et al. 2011), robotic therapy (Ochi et al 2013, Picelli et al. 2015) and constraint-induced movement therapy (Rocha et al. 2016) have been successfully applied in conjunction with tDCS.

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in motor stroke rehabilitation:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 on consecutive weekdays, 2-3 weeks
Montage	anode on ipsilesional M1 (mainly C3 or C4) cathode on the contralateral supraorbital region.
Cap model	HM3S/M/L, turn the cap inside out if targeting right M1 instead of left M1. If the lesion does not fall in M1 region use fabric straps for positioning electrodes according to the lesion position.
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2

References

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Epilepsy

Introduction

Epilepsy is a neurologic disorder causing characteristic seizures. The seizures typically recur, and may even cause physical injuries. The seizures are due to abnormalities in the nerve cell activity typically in hippocampus or in a cortical or subcortical structural malformation. Epilepsy is usually treated with daily medication or surgical removal or isolation of the seizure source.

tDCS effect on cortical excitability has increased the clinical interest to investigate its potential to prevent epileptic seizures. The safety of tDCS on epileptic patients has been demonstrated with anodal (2 mA, 20 min) stimulation of the left DLPFC. tDCS did not increase seizures in the 33 patients included. (Liu et al 2016) In animal studies, tDCS has been found to suppress epileptiform activity in rats (San-Juan et al. 2015).

Clinical evidence

The major part of the current literature has applied cathodal tDCS to the epileptic region. In a proof of concept study, it was showed that cathodal tDCS of the epileptogenic area (identified with EEG) resulted in significant reduction of epileptiform discharges (-64.3%) and a trend towards seizure reduction (-44.0%) with 10 patients receiving active tDCS (1 mA for 20 min). 9 patients who received sham did not benefit. (Fregni et al. 2006) A single cathodal tDCS (1 mA, 20 min) session of the seizure focus decreased the number of seizures (-57.6%) in children aged 6-15 years. The effect was significant 24h, 48h and even four weeks after intervention. (Auvichayapat et al. 2013)

A recent study demonstrated a greater decrease in seizure frequency and interictal epileptiform discharge in the active group than in the sham group with cathodal tDCS of the left M1 (C3). The anode was positioned on the right shoulder, and the tDCS was delivered with 2 mA for 5 sessions of 20 min. (Auvihayapat et al. 2016)

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in epilepsy:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 on consecutive weekdays
Montage	cathode on epileptogenic focus anode on the contralateral supraorbital region
Cap model	Rubber straps RS5520
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2

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Parkinson's disease

Introduction

Parkinson's disease (PD) is a long-term degenerative disorder affecting mainly mobility and fine motor skills. Symptoms include shaking, slowness in movements, and rigidity. Deep brain stimulation has been successfully applied in PD, which has raised interest in noninvasive brain stimulation methods as an alternative. The rational to use tDCS is based on its attribute to modulate brain activity and functioning in the targeted area.

Clinical evidence

The effects of anodal tDCS of the right or left DLPFC have been studied in various clinical trials e.g. on working memory (Boggio et al. 2006), verbal fluency (Pereira et al. 2013), executive or cognitive functions (Doruk et al 2014 and Manenti et al 2016) and walking abilities (Manenti et al. 2014). The effects of tDCS on gait and motor performance have been studied using motor cortex as the target stimulation area (Verheyden et al. 2013, Kaski et al 2014, Valentino et al 2014, Costa-Ribeiro et al. 2016 and Ferrucci et al. 2016).

The current literature indicates a potential impact of anodal tDCS of M1 on walking and motor symptoms, as well as anodal tDCS of the left DLPFC (or the DLPFC side contralateral to the mainly affected side)on verbal fluency and working memory, but the evidence is too weak to make recommendations for any particular tDCS protocol.

Sooma's solution

According to clinical evidence, Sooma recommends the following protocol for investigational and research use in Parkinson's disease:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	5 to 10 sessions on consecutive weekdays
Montage	anode on M1 (mainly C3 or C4) cathode on the contralateral supraorbital region.
Cap model	1.& 2. HM3S/M/L, turn the cap inside out if targeting right M1 instead of left M1. 3. SCS2, SCM2, SCL2 for prefrontal stimulation.
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2

References

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Alzheimer's disease

Introduction

Almost every tissue and cell is in some manner sensitive to electric fields. Therefore, tDCS can affect not only neurons but also supporting cells, including endothelial cells or lymphocytes. Thus, it can be hypothesized that tDCS might slow down the progression of neurodegeneration in Alzheimer's disease (AD) (Heneka et al. 2015, Ruohonen and Karhu 2012). There are two different electrode montages used in AD patients. To improve cognitive performance, tDCS is targeting the DLPFC, and to improve recognition memory, tDCS is targeting the temporo-parietal region.

Clinical evidence

Seven RCTs with 10-40 patients have been conducted, five of which have applied more than one single tDCS session. Five sessions of anodal tDCS targeting the temporal cortex (T3 and T4) with the cathode on the right deltoid improved

visual recognition memory by 9% from baseline whereas sham stimulation reduced it by 2% (Boggio et al. 2012). However, a recent study reported nonsignificant changes on verbal memory when applying anodal tDCS on the temporal cortex (Bystad et al. 2016).

Ten sessions of frontal stimulation (anode: F3, cathode: right deltoid) combined with individualized speech therapy significantly improved experimental naming compared to sham stimulation (Cotelli et al 2014). The effect was maintained up to 12 weeks follow-up. With the same protocol as Cotelli et al. (2014), Khedr et al. (2014) reported improvement in mini-mental state examination (MMSE) and a reduction of P300. Three weekly tDCS sessions targeting the frontal cortex (anode: F3, cathode: right orbit) during two weeks did not result in improvements in apathy scores or other cognitive tests (Suemoto et al. 2014).

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Sooma's solution

Due to limited evidence and varying outcomes, we cannot currently favor either frontal or temporo-parietal tDCS for slowing down neurodegeneration in AD.

For research and investigational purposes Sooma recommends the following parameters and accessories to reproduce and conduct clinical research:

Stimulation intensity	2 mA
Session duration	20 min
Total number of sessions	10 sessions on consecutive weekdays
Montage	1. Anode: F3, Cathode: right deltoid 2. Anode: T7, Cathode: right supraorbital region
Cap model	Sooma rubber straps RS5520 and fabric strap FS40 for deltoid position.
Electrode size	35 cm^2
Electrode model	ELM2 + SPM2

Accessories

Electrodes

ELM1: 50x70 mm + 50x100 mm

ELM2: 50 x 70 mm

EL55: 50x50 mm

Rubber straps
for customized electrode positions

RS5520:
- 5 x short rubber strap, 45 cm
- 5 x long rubber strap, 67 cm
- 20 x Plastic strap button to fasten the straps

Electrode sponges

SPM1: 50x70 mm + 50x100 mm

SPM2: 50x70 mm

SP55: 50x50 mm

Fabric strap
for limbic electrode positions

FS40: 10 cm x 40 cm strap with velcro

Sooma Oy
Kuortaneenkatu 2
FI-00510 Helsinki, Finland

Tel. +358 10 328 9811
Email: info@soomamedical.com
www.soomamedical.com