Aims: We test the possibility to ameliorate execution of reaching movements in chronic (>6 months) unilateral stroke patients by inhibiting triceps cM1 by means of 1-Hz rTMS. We are using kinematic parameters provided by robotic exoskeleton for upper limb rehabilitation (Armeo Spring – Hocoma GmbH) to assess rTMS effects.

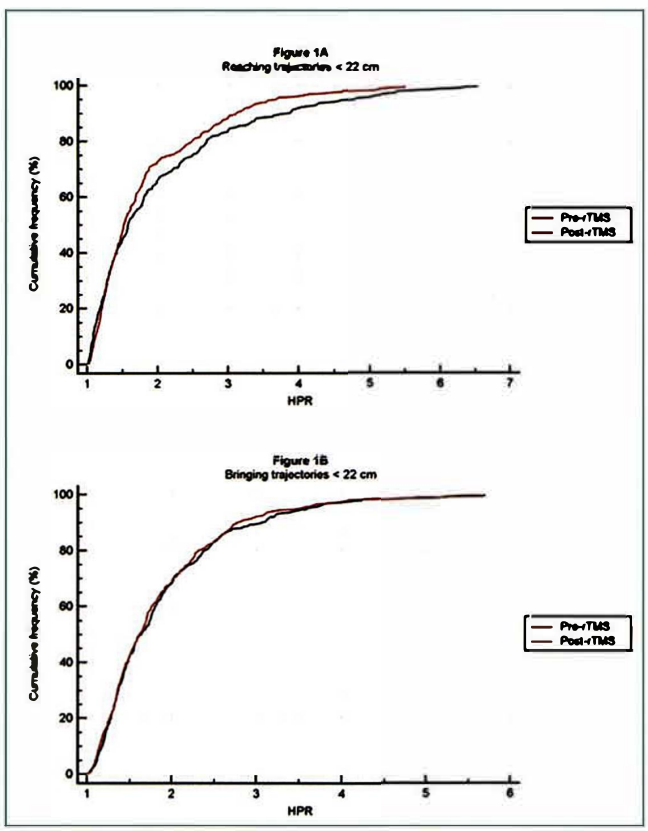
Methods: The study has five phases of one week each. During weeks II and IV, patients perform on daily basis: basal Armeo session, rTMS (active or sham according to sequence randomisation) and subsequent Armeo session aimed to assess immediate changes in movement kinematic parameters.

Hand/path ratio (HPR) is defined as quotient between actual hand trajectory and shortest distance. HPR scores obtained during trajectories requiring elbow extension (reaching) are used as primary outcome measure, whereas HPR of elbow flexion movements (bringing) are used as additional control measures.

Secondary outcome measure include changes in upper limb Fugl Meyer scale (ULFMS) and other robotic kinematic parameters.

Results: Five patients so far enrolled executed number of tasks that allowed interim analysis. In pre-rTMS sessions, HPR of reaching movements was 1.71±0.03, whereas in post-rTMS sessions, HPR decreased to 1.61±0.02 (p=0.12, n=764). This effect was more evident for target distances <22 cm (Fig 1A, pre-rTMS 2.07±0.07; post-rTMS 1.85±0.05, n=325, p=0.03).

HPR of bringing trajectories showed not significant change after rTMS, neither for target distances <22 cm (Fig 1B, n=362).



Sham-rTMS induced no effects on reaching HPR, nor on bringing HPR. ULFMS difference between week I and V was 1.6±0.4

Summary/Conclusions: Preliminary data suggest that 1-Hz rTMS over contralesional triceps area could transiently improve execution of reaching movements in a muscle-specific manner. HPR exhibits ceiling effect for longer target distances. We are enrolling other patients to better characterize these early results.

Disclosure: No significant relationships.

Keywords: upper limb rehabilitation, TMS, robotic rehabilitation, stroke, interhemispheric inhibition

O-36

NEUROMODULATION WITH WHOLE-HAND ELECTRICAL STIMULATION IN STROKE PATIENTS IN SUBACUTE STAGE

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Background: Peripheral electrical stimulation has been proved to modulate cortical plasticity in healthy and in patients. Such neuromodulatory effects have been also found after application of electrical hand mesh-glove stimulation (MGS) in our previous studies on healthy subjects.

Aims: The present study examines the effect of whole-hand electrical stimulation on motor recovery in stroke patients at the subacute stage.

Methods: Patients with cortico-subcortical ischemic stroke and predominantly motor hemiparesis of the upper extremity were recruited for the study. MGS was applied on the paretic hand daily for 60 min before the standard rehabilitation training over three weeks. The hand motor and sensory functions were evaluated with Wolf Motor Function test, Fugl-Meyer Assessment score, Nine hole peg test, and Semmes-Weinstein monofilaments. Single and paired-pulse transcranial magnetic stimulation (TMS) was applied to follow the corticospinal excitability changes over the treatment period. Further, functional magnetic resonance imaging (fMRI) was conducted to assess the cortical brain reorganization changes after the treatment. Effects of MGS were compared to control group receiving sham stimulation.

Results: Patients form both groups showed significant functional improvement as assessed with the motor functional tests. However the improvement degree for the MGS group was increased compared to the control group. These functional effects correlated with neuroplastic changes within the sensorimotor area as revealed by TMS and fMRI.

Summary/Conclusions: Electrical stimulation applied before a physiotherapeutic training raise the motor cortical excitability in the lessoned cortex so that the subsequent training becomes more effective. The obtained results provide better understanding how modulation of central motor controlling structures by somatosensory stimulation correlates with the functional motor recovery.

Disclosure: No significant relationships.

Keywords: stroke, neuromodulation, neuroplasticity, stroke rehabilitation

O-37

ASSOCIATIVE MEMORY CAN BE IMPROVED BY NONINVASIVE BRAIN MODULATION BY TRANSCRANIAL DIRECT CURRENT STIMULATION OF THE PARIETAL ASSOCIATIVE CORTICAL AREA?

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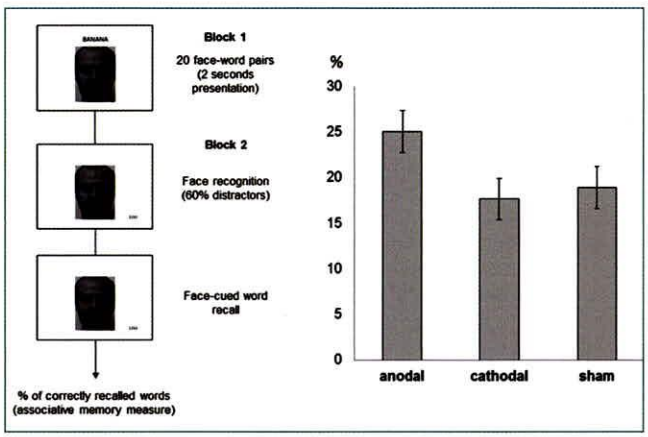
Background: Memory problems are frequently encountered in a range of the neurological conditions. They are quite difficult and challenging issue in neurorehabilitation. Some recent data suggest that it may be possible to improve performance on some of the memory tests by physiologically modulating activity within a neural loop consisting of the hippocampus and the lateral parietal cortex, which plays crucial role in formation and maintenance of the associative memory.

Aims: To check the differential effects of facilitatory and inhibitory noninvasive neuromodulation by transcranial direct current stimulation (TDCS) on associative memory.
Methods: Using a Latin Square experimental design, we tested 19 healthy right-handed participants (8 male, age 22–35 y) in a cross-over placebo-controlled study. Following 20-minute of either anodal (facilitatory), cathodal (inhibitory) or sham (placebo) TDCS over left lateral parietal cortex, in 3 separate sessions with 5–7 days inter-session intervals, participants completed a face-cued word recall test of associative memory.
Results: The repeated measures ANOVA showed significant main effect of stimulation type ($F_{(2,36)}$=3.71, p=.034, η2=.171). Post-hoc tests revealed that participant performed better after anodal than after both, cathodal and sham stimulation. However, the difference between anodal and cathodal stimulations was significant (p=0.029) while the difference between anodal and sham stimulations was not (p=0.066). There was no difference between cathodal and sham stimulations (p=0.59).



Summary/Conclusions: Noninvasive brain modulation has a potential to improve performance on tasks requiring associative memory engagement. The effect may prove to be beneficial for cognitive neurorehabilitation.
Disclosure: No significant relationships.
Keywords: associative memory, cognitive neurorehabilitation, non-invasive brain modulation, transcranial direct current stimulation, lateral parietal cortex

O-38

SAFETY AND EFFICACY OF INCREASING DOSES OF INCOBOTULINUMTOXIN A (XEOMIN®; 400 U–800 U) IN THE TREATMENT OF MULTIFOCAL UPPER AND LOWER LIMB SPASTICITY: RESULTS OF THE PHASE III TOWER STUDY

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Background: Patients with severe multifocal spasticity may benefit from botulinum toxin treatment at higher doses than currently generally used.
Aims: To evaluate the safety and efficacy of increasing incobotulinumtoxinA (Xeomin®, Merz Pharmaceuticals GmbH) doses (400 U up to 800 U) for patients with spasticity.
Methods: This prospective, single-arm, dose-titration study (NCT01603459) enrolled adult patients (18–80 years) with spastic hemiparesis due to cerebral causes, who were deemed to require total body doses of 800 U incobotulinumtoxin A. Patients received 3 consecutive injection cycles (ICs) with 400 U, 600 U, and 600–800 U incobotulinumtoxin A, respectively, each followed by 12–16 weeks' observation. Outcomes included: adverse events (AEs), Resistance to Passive Movement Scale (REPAS, based on the Ashworth Scale), Goal Attainment Scale (GAS), and EuroQoL 5-dimensions (EQ-5D) questionnaire.
Results: In total, 155 patients were enrolled. IncobotulinumtoxinA dose escalation did not lead to an increased incidence of AEs (IC1: 36.1%; IC2: 37.5%; IC3: 25.7%). The most frequent AEs overall were falls (7.7%), nasopharyngitis, arthralgia, and diarrhea (6.5% each). No treatment-related serious AEs occurred; 5 patients (3.2%) discontinued due to AEs.
The mean (standard deviation [SD]) change in REPAS score from each injection to 4 weeks post-injection increased throughout the study (IC1: -4.6 [3.9]; IC2: -5.9 [4.2]; IC3: -7.1 [4.8]; p<0.0001 for all). The proportion of patients achieving ≥3/4 treatment goals increased from 25.2% for IC1, to 50.7% for IC2, and 68.6% for IC3. Mean (SD) EQ-5D QoL scores improved from 59.9 (18.9) at baseline to 69.7 (17.6) at the end of study visit (p<0.0001).
Summary/Conclusions: Increasing incobotulinumtoxinA doses (400 U up to 800 U) enabled treatment in a greater number of muscles, leading to increased treatment efficacy resulting in improved muscle tone, individual goal attainment, and quality of life, without compromising patients' safety or tolerability.
Disclosure: JW, DB: Research grants, consulting fees, speaking honoraria from Merz, Ipsen, Allergan and Medtronic AS, OS: Employees of Merz Pharmaceuticals GmbH DS: Research grants, consulting fees from Merz, Ipsen, Allergan and Acorda, and speaking honoraria from Allergan.
Keywords: Botulinum toxin, spasticity, incobotulinum toxin A, clinical trial, quality of life

O-39

BASELINE CHARACTERISTICS IN PATIENTS FROM AN INTERNATIONAL PROSPECTIVE, NON INTERVENTIONAL STUDY TO ASSESS LONG TERM EFFECTIVENESS OF ABOBOTULINUMTOXIN A (ABO) IN POST STROKE ARM SPASTICITY (PSAS) WITH RESPECT TO START OF TREATMENT

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Background: Several studies have shown that botulinum toxin A (BoNT A) is effective and well tolerated in alleviating PSAS. Little data exist with respect to the relationship between start of treatment after stroke and development of spasticity.
Aims: This abstract presents the study methodology and planned interim analysis of baseline characteristics of the study population.
Methods: The first 121 out of 300 adult patients with PSAS, naïve to or pre-treated with BoNT A, were analysed. Patients were divided in groups according to the time between occurrence of stroke and start of treatment (early, medium and late start according to first, second and third quartiles time distribution, missing data: 6 patients related to date of stroke and/or first BONT A treatment). The study encompasses 4 injection cycles with ABO. Demographics, previous treatment with BoNT A, arm spasticity patterns [1], composite MAS score (sum of elbow, wrist flexors), pain (VAS), were recorded at baseline.
Results: Demographic characteristics (age, weight) were similar across groups, except for the »late start« treatment group which had a higher female proportion (55.2%) vs. all subjects (38.8%). Distribution of arm spasticity patterns were similar to previous reports [1] (Type I: 13.6%, Type II: 2.5%, Type III: 41.5%, Type IV: 39.0%, Type V: 3.4%).

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