Objectives: In the current randomized controlled trial (RCT) we used a form of repetitive TMS, theta burst stimulation (TBS), to study whether such stimulation could induce long-lasting modifications of LH circuits, and improve the functional recovery and clinical outcome of sub-acute stroke patients with neglect.
Methods: We applied real or sham continuous TBS (cTBS) over the left PPC, for two weeks. Severity of neglect was assessed by means of the standardized behavioural inattention test (B.I.T.). In addition, we also measured, by means of bifocal transcranial magnetic stimulation (TMS), how cTBS modified the excitability of the parieto-frontal functional connections in the intact LH.
Results: We found that two weeks of cTBS were effective in improving neglect syndrome as measured by B.I.T. Moreover, we also found that hyper-excitability of LH parieto-frontal circuits was reduced following treatment with real but not cTBS. All these effects were evident at the end of the two weeks of treatment and persisted even after one month.
Conclusions: These findings suggest that a two-week course of cTBS of the PPC of the intact hemisphere may be effective in reducing visuospatial neglect in stroke patients.

P25.20
Robot-aided therapy for upper limbs in patient with chronic stroke-related lesions. Brief report of a clinical experience

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Introduction: A 56 years old patient, who presented chronic stroke-related lesions, PACI right hemisphere (August 2009), left hemiparesis with a moderate/severe upper limb impairment and moderate disability (Barthel Index 69/100), was admitted to upper limb robotic rehabilitation treatment.
Objective: The goal of the present study is to verify whether upper limb motor improvement in a chronic stroke patient treated with robot-aided rehabilitation correlates with cortical changes, and if the effects persist for at least 2 months.
Methods: The treatment consisted of 30 sessions with the InMotion2 robotic platform, lasting 45 minutes each, 5 days a week, for a total period of 6 weeks. The rehabilitative protocol was designed for the improvement of movement type (i.e., the joints involved, with a proximal-distal progression) and mode of execution (with progression from passive to free movement). Simultaneously to the robotic treatment, patient's kinematic, EEG, EOG, and EMG data were recorded. EEG data were spatially enhanced by surface Laplacian estimation, and cortical activity was evaluated by computing ERD/ERS events. Furthermore, corico-muscolar compuling was evaluated by computing EEG-EMG spectral coherence and directed tranfer function (DTF). The patient underwent assessments prior the start (T0), at the end of the treatment (T1) and after two months from the end (T2). Several tests were administered, such as: Fugl-Meyer (FM), Strength Evaluation (MRC), and Ashworth scale (AS) for upper limb; Visual Analogue Scale (VAS) for pain; Box and Block Test (BBT); Frenchay Arm test (FAT); Timed Up and Go (TUG) test; Functional Infependence Measure (FIM^{TM}) and Barthel Index (BI). Additionally, the Euro-QoL questionnaire ad a VAS for the treatment satisfaction were administered to the subject.
Results and Conclusions: Results showed a reorganization of cortical activity and cortico-muscular coupling after 2 months of robotic rehabilitation tasks. Kinematic data showed a distinct change in the movement patterns (such as smoothness and trajectory approach), tending to those measured in healthy subjects.

P25.21
A computational model of the effects of training schedules in neurorehabilitation

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Introduction: Retention of motor tasks can be affected by practice schedule both in healthy and stroke subjects. Specifically, interleaving tasks during training produces higher retention compared to a blocked practice, where all the training on one task is completed before a new task is trained. On the other hand, motor learning studies suggest that acquisition of motor skills leads to the formation of an internal model.
Objectives: Current models do not address the issue of practice structure. This is fundamental both in neuroscience and neurorehabilitation to understand how motor tasks are learned and consolidated. We implemented a computational model of the human arm, based on an internal model that is able to reproduce the effects of training schedule on retention.
Methods: The internal model is implemented with a Locally Weighted Projection Regression neural network that dynamically allocates local linear models depending on the input data distribution. The network is trained on reaching movements towards 8 targets while a velocity-dependent force field perturbs the hand. Each target corresponds to a different task. Three training schedules are used, in which tasks are presented in a blocked, inter-mixed and random fashion. The amount of motor retention is quantified with the distance between the actual and desired trajectory.
Results: Motor retention is affected by two main factors, namely forgetting of previous observations (the weight of previous data points in the current update of the network parameters) and training schedule. When forgetting is low, the 3 training schedules produce similar results. Increasing forgetting of previous observations increases retention in inter-mixed and random training.
Conclusions: Proper values of forgetting allow the model to reproduce the benefits of interleaved versus blocked training. We envisage the possibility to extend this model to design neurorehabilitation treatments schedules for hemiparetic subjects as well as to study the mechanisms of motor recovery from stroke.

P25.22
Increases in the excitability of spinal inhibitory pathways from intensive locomotor training after incomplete spinal cord injury

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Introduction: After incomplete Spinal Cord Injury (iSCI), the excitability of spinal inhibitory networks is reduced, contributing to poor muscle control (excessive co-activation) during tasks such as walking.
Objective: We examined if intensive locomotor training can improve the excitability of spinal inhibitory networks activated by both descending and sensory inputs.
Methods: Spinal circuits to the tibialis anterior (TA) muscle were activated by the corticospinal tract (CST) from transcranial magnetic stimulation (TMS). These spinal circuits were then conditioned by low-intensity stimulation of the common peroneal nerve (CPN: interstimulus interval of 40, 50 and 60 ms prior to TMS) to activate spinal inhibitory pathways. The resulting suppression of the evoked motor potential (MEP) was considered to be a measure of spinal inhibition given that a similar suppression of evoked responses occurred from direct stimulation of the CST. In addition, the magnitude of cutaneomuscular reflexes in the TA evoked from tibial nerve stimulation at the ankle, which has been shown to activate spinal inhibitory circuits, was also examined before and after training. Subjects received 2 months of endurance (treadmill) and precision (walking over obstacles) training in random order.
Results: Training increased the amount of MEP suppression from CPN stimulation from 15 to 30% MEP inhibition (n = 4 subjects). Skill training