previous pilot study on 21 patients. When pooling data with the latter study, a strong correlation between resting motor threshold and clinical improvement in walking tests was found exclusively in the real rTMS group.

Conclusions: Resting motor threshold results from the combination of corticospinal excitability and of the amount of corticomotor fibers available for conduction. While rTMS mainly acts on the former mechanism, both at the cortical and spinal level, the latter is a limiting factor in the presence of corticospinal damage, as in the case of progressive MS with lower limb motor involvement. In this condition, resting motor threshold could be considered an rTMS specific therapeutic reserve index, being predictive of therapeutic response to corticospinal neuromodulation.

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Efficacy of mental imagery to improve autobiographical memory in multiple sclerosis patients: a double approach in neuropsychology and neuroimaging

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Background: We previously showed autobiographical memory (AM) impairment in non-depressed relapsing-remitting multiple sclerosis (RR-MS) patients, very likely caused by a retrieval-strategy deficit. From that observation, a mental visual imagery (MVI)-based facilitation program was created.

Objectives: To probe the efficacy of this program on AM retrieval, by testing both clinical and cerebral network changes in pre- and post-facilitation.

Methods: All MS patients underwent a neuropsychological baseline and an AM assessment sessions. Then, the patients were allocated in three groups:

(i) experimental (EG; n = 10) who followed the MVI program,
(ii) placebo (PG; n = 10), who followed a sham verbal program. A post-facilitation reassessment of AM was conducted afterwards for these two groups.
(iii) The stability group (n = 13) underwent the AM test twice, with no intervention in between.

The EG and the PG completed also two fMRI sessions, during which they had to mentally evoke personal memories, within a pre-/post-facilitation study design. For each memory, a distinction between the initial retrieval and the further elaboration (search of additional details associated to the event) was made.

Results: For the first AM assessment, no significant difference was observed between the three groups. However, in post-facilitation, only the EG showed a significant improvement of their AM performances ($p < 0.001$). After facilitation, this AM improvement in the EG was accompanied with increased activations in the medial frontal regions during memories' retrieval and by decreased activations mainly in the lateral frontal regions during memories' elaboration ($p < 0.001$ unc; $k = 20$). Regarding the PG, after facilitation, we observed decreased activations in the medial frontal area during retrieval and increased activity in the superior frontal gyrus during elaboration ($p < 0.001$ unc; $k = 20$).

Conclusions: Clinically, this MVI-based program led to an AM improvement and was not attributable to a nursing or a test learning effects. Cerebral activation changes reflecting both an increase reliance on brain regions sustaining self-referential process and a decrease of those reflecting an effortful research process were displayed after the MVI program. While brain activity changes were also observed in the PG, they likely reflected an attempt to use the alternative sham strategy, but with no efficiency on AM functioning.

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Evaluation of gait abnormalities in MS patients with minimal disability

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Background: Gait abnormalities are a common feature of the multiple sclerosis (MS) patients. Even MS patients with minimal clinical disability (EDSS 0-1,5) show in kinetic and kinematic analysis decreased velocity of gait, shorter step length and impaired balance.

Objectives: To assess whether abnormalities of gait in minimally impaired MS patients are measurable by tests commonly used in clinical practice and identify specifically which parameters of gait cycle change in patients with EDSS 0-1.5.

Methods: We enrolled 65 MS patients with EDSS 0-1.5 (median age 35 years, range 25-51, 76% female), 29 MS patients with EDSS 2-2.5 (median age 37 years, range 22-57, 69% female) and 47 normal controls (median age 37 years, range 22-52, 77% female).

Tests performed include 25 foot walk test (25FWT), two minute walk test (2MWT), temporal and spatial gait analysis on GAITRite (velocity, cadence, step length, step time and percentage of double support).

Results: There is a significant difference in 25FWT between normal controls and patients with EDSS 0-1.5 as well in 2MWT. Gait assessment at fast speed of walking on GAITRite revealed significantly decreased cadence, prolonged step time, shorter step length and increase in percentage of double support time between patients with EDSS 0-1.5 and normal controls. These measures did not reach significance when measured at self selected speed of walking. The difference between fast speed of walking and self selected speed of walking is significantly lower in patients with EDSS 0-1.5 in comparison with normal controls.

Conclusions: Both tests of walking (25FWT, which is faster, as well as longer 2MWT) identified gait abnormalities in group of minimally impaired patients in comparison with normal controls.