

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (rTMS) COMBINED WITH COGNITIVE TRAINING IN ALZHEIMER'S DISEASE AND MILD COGNITIVE IMPAIRMENT: A RANDOMIZED CONTROLLED CLINICAL TRIAL

Barocco F¹, Bagattini C^{1,2}, Zanni M¹, Miniussi C², Defanti CA¹

¹ Alzheimer Center, Briolini Hospital FERB ONLUS (Gazzaniga, BG)

² Cognitive Neuroscience Section, IRCCS San Giovanni di Dio Fatebenefratelli Center (Brescia)



XLVIII CONGRESSO NAZIONALE 14-17 OTTOBRE 2017 NAPOLI



OBJECTIVE

Considering the limited efficacy of pharmacological approaches in Alzheimer's disease (AD) treatment, interventions able to slow down or even halt disease progression represent an urgent need in clinical research. rTMS is a promising non-invasive method for the treatment of cognitive deficits in neurodegenerative diseases. The aim of the present study was to assess the cognitive effects induced by the combined application of rTMS with cognitive training in AD and Mild Cognitive Impairment (MCI) patients.

MATERIALS & METHODS

22 patients

(12 mild AD: mean age=70.9, mean MMSE=21.4; 10 MCI: mean age=73.9, mean MMSE=24.4)

Subjects were randomly assigned to one of two groups: the **experimental group (N=12)** underwent *real-20Hz-rTMS*, while the **control group (N=10)** underwent *sham-rTMS*. Both groups received *cognitive training (CT)* targeting physiognomic memory.

The combined treatment consisted in **20 daily sessions** (5 days per week, for 4 weeks) including **25 minutes of rTMS** applied over the left dorsolateral prefrontal cortex, followed by **25 minutes of CT**.

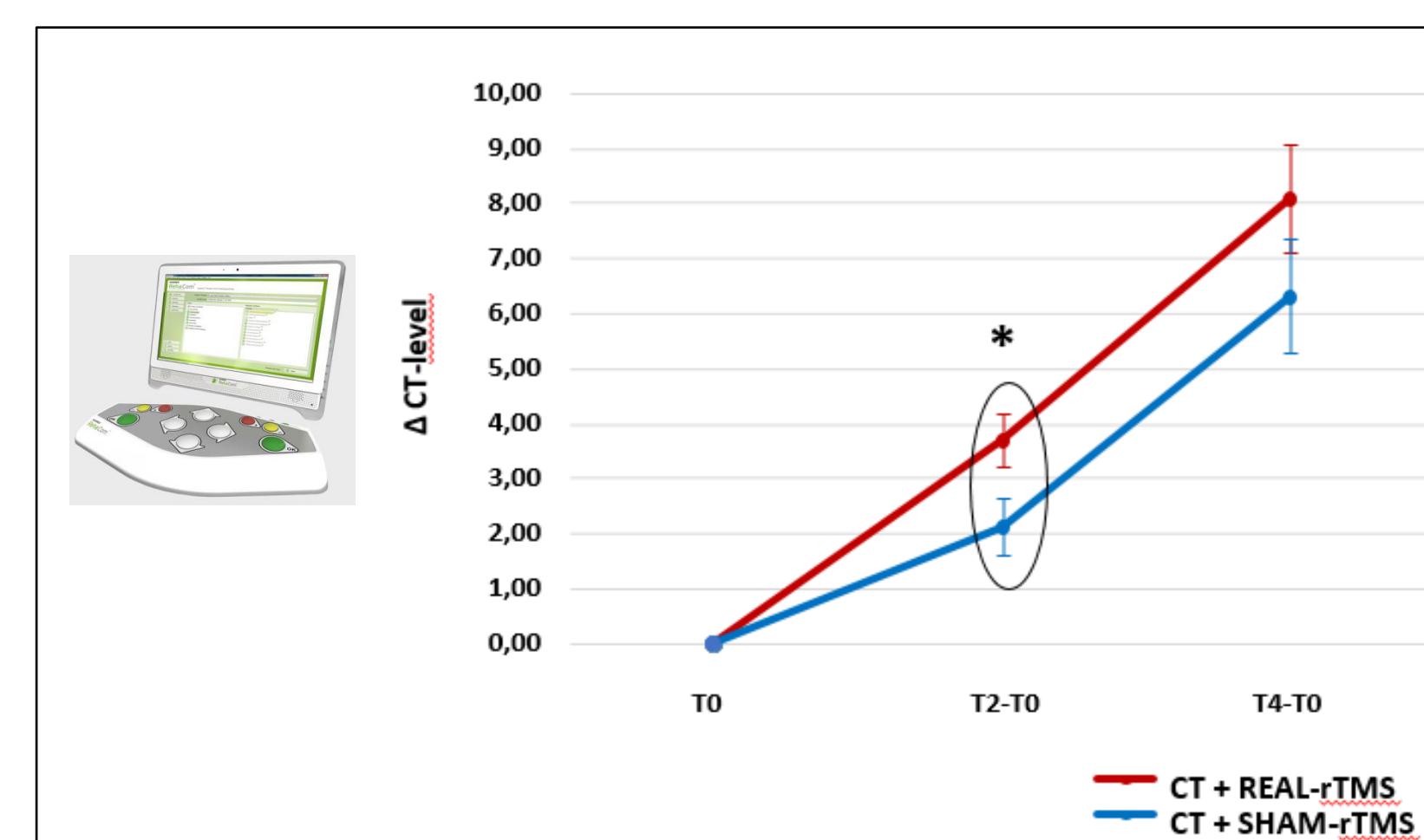
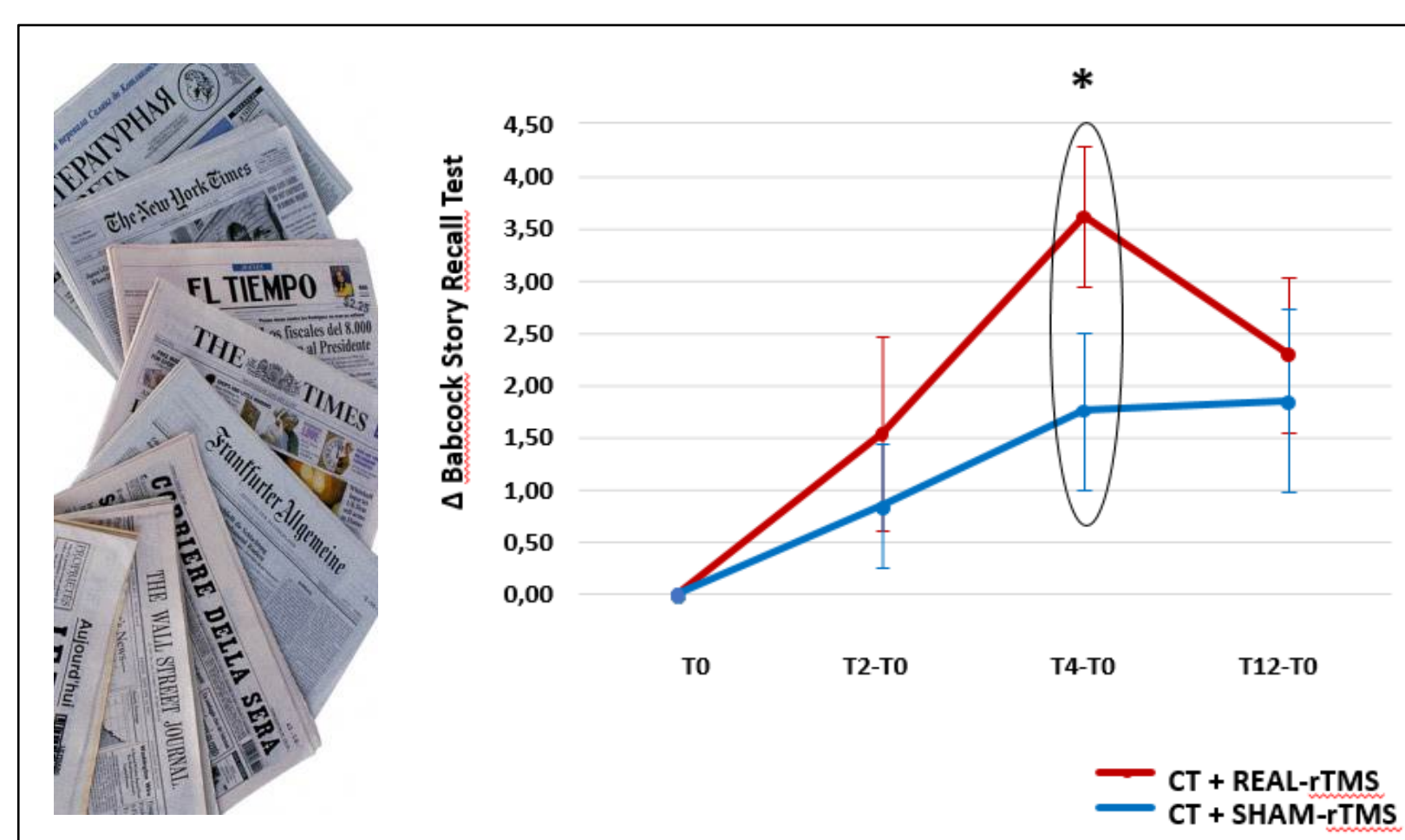
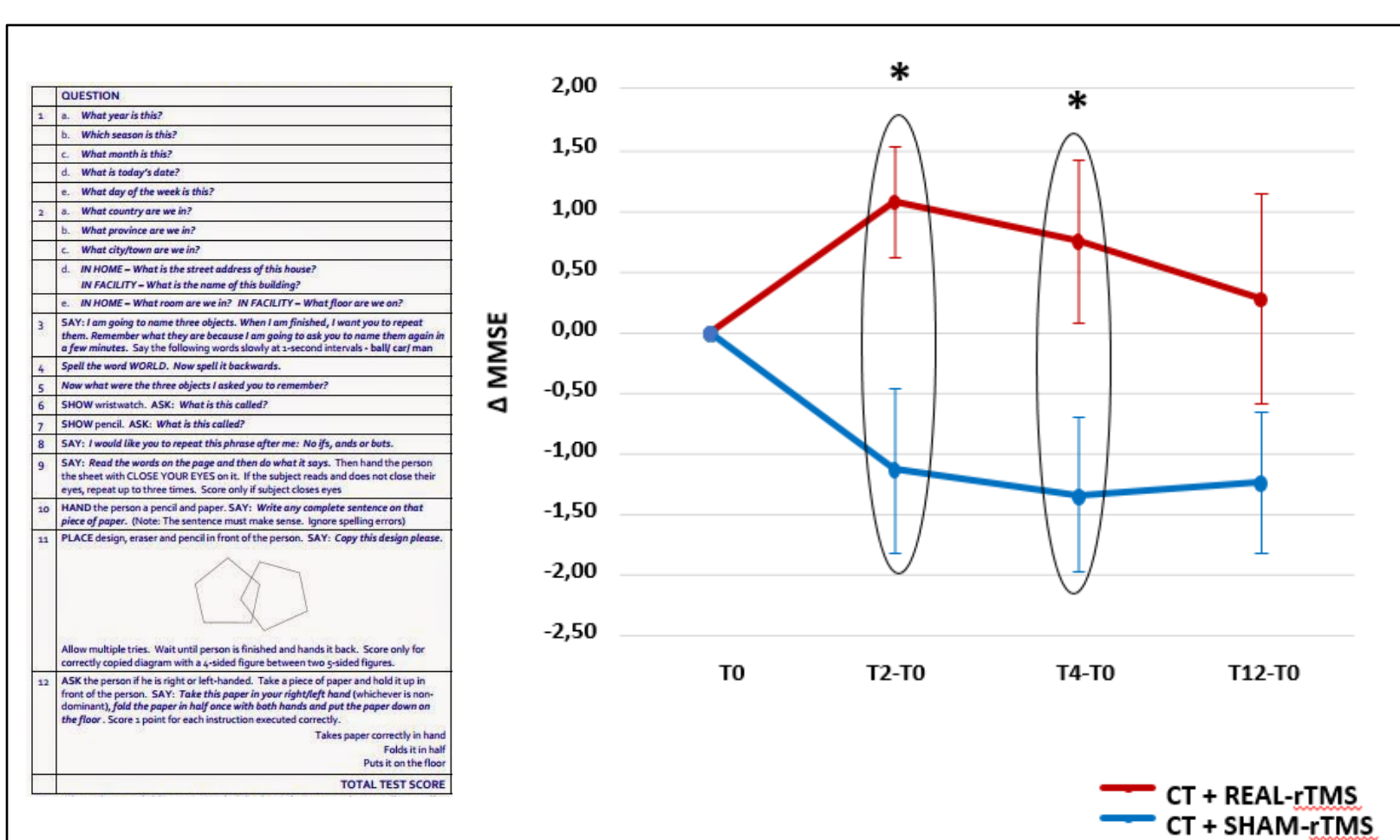
Both groups underwent clinical and neuropsychological assessment at baseline (T0), 2 and 4 weeks later (T2, T4) and a follow-up performed 3 months after the beginning of the treatment (T12), evaluating multidomain cognitive functions, functional abilities and neuropsychiatric symptoms.



RESULTS

The combined application of real-rTMS with CT induced an improvement in global cognitive functioning after 2 (difference from T0 in MMSE score: *real*= 1.08; *sham*= -1.14) and 4 weeks (*real*=0.75; *sham*=-1.34) of treatment.

As regards to memory, CT alone succeeded in improving all measures assessed that lasted at least 3 months (T12). The addition of real-rTMS resulted in a further improvement of verbal memory at the end of treatment (T4). Both the treatments had no effect on executive functions and neuropsychiatric symptoms.



The present study is still ongoing and is aimed at recruiting at least 50 more patients.

CONCLUSIONS

These findings provide preliminary evidence for the beneficial effect of the combination between rTMS and cognitive training in ameliorating global cognitive functioning and memory functions.

Despite this promising result, the additional improvement induced by rTMS was not maintained in the follow up assessment, possibly suggesting the need of maintenance sessions.

rTMS combined with cognitive training represents a promising tool in the rehabilitation of cognitive decline.

Further studies, including larger samples and longer follow-up, are needed to confirm this technique as an effective adjuvant treatment for AD and MCI patients.

REFERENCES

- Cotelli M et al. Improved language performance in Alzheimer disease following brain stimulation. *J Neurol Neurosurg Psychiatry* (2011);82:794-797
- Lefaucheur JP. Evidence-based guidelines on the therapeutic use of repetitive transcranial magnetic stimulation (rTMS). *Clin Neurophysiol* (2014);125(11):2150-206
- Miniussi C et al. Transcranial magnetic stimulation in cognitive rehabilitation. *Neuropsychol Rehabil* (2011);21(5):579-601