Cortical excitability in chronic migraine patients after preventive treatment, measured by TMS

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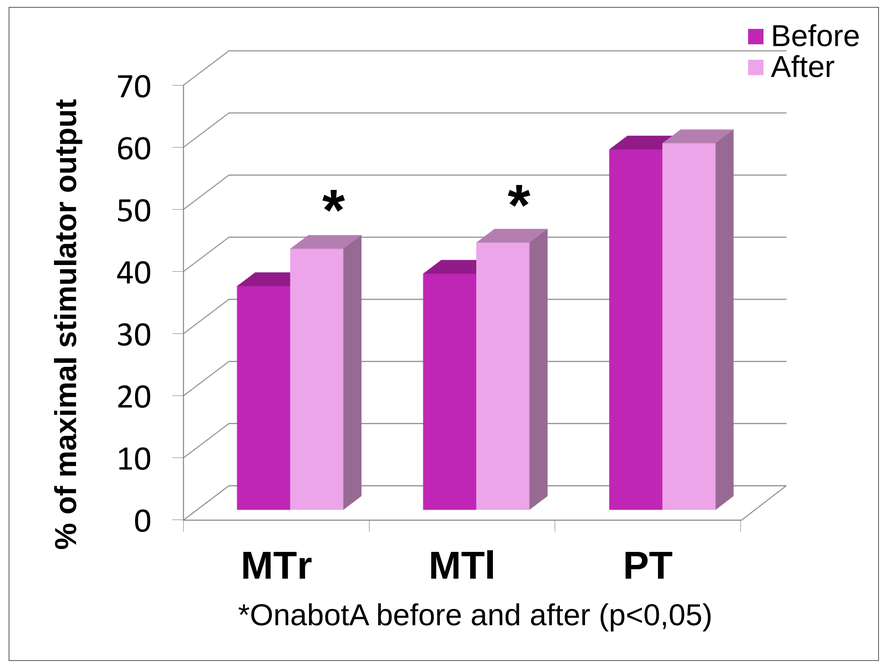
Objective: OnabotulinumtoxinA (OnabotA) and topiramate are regulatory approved effective medications for chronic migraine (CM) preventive treatment; however, the exact mechanisms of their antinociceptive action in CM are not fully understood.

Methods: 85 patients with CM (mean age 44, women 97%, diagnosed according to the ICHD-III beta, 2013) were included in the open-label prospective study. Clinical data (headache days per month) were collected from headache diaries. TMS was performed twice: before and 3 months after OnabotA injections (according to the PREEMPT paradigm; n=43) or Topiramate (100 mg/day; n=42).

We assessed:

- motor cortex thresholds - MT r/l (% of maximal stimulator output),
- cortical silent period duration - CSP r/l (ms) - by motor cortex stimulation and registration of the responses from abductor digiti minimi muscles,
- phosphene threshold - PT (% of maximal stimulator output) - by visual cortex stimulation.



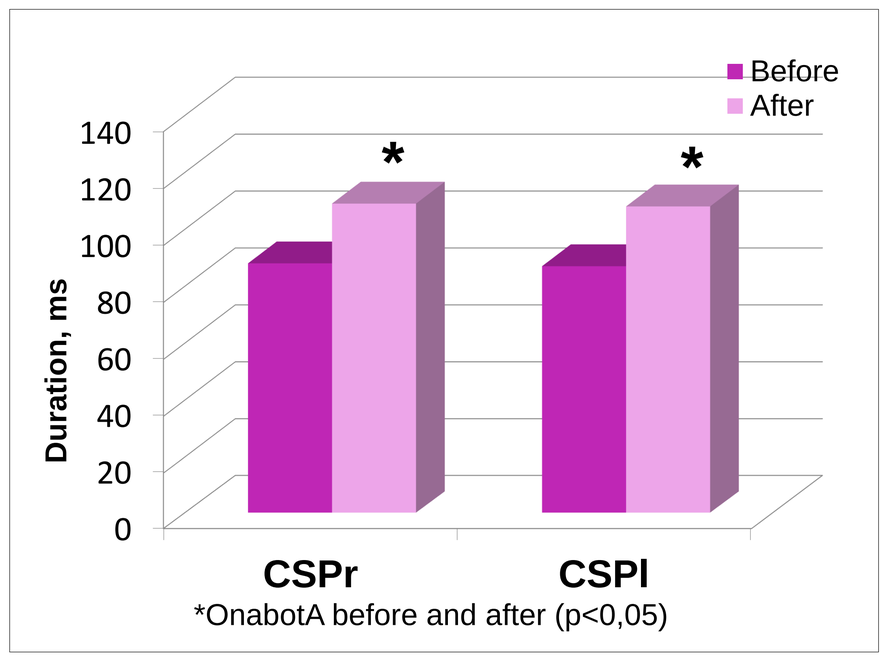
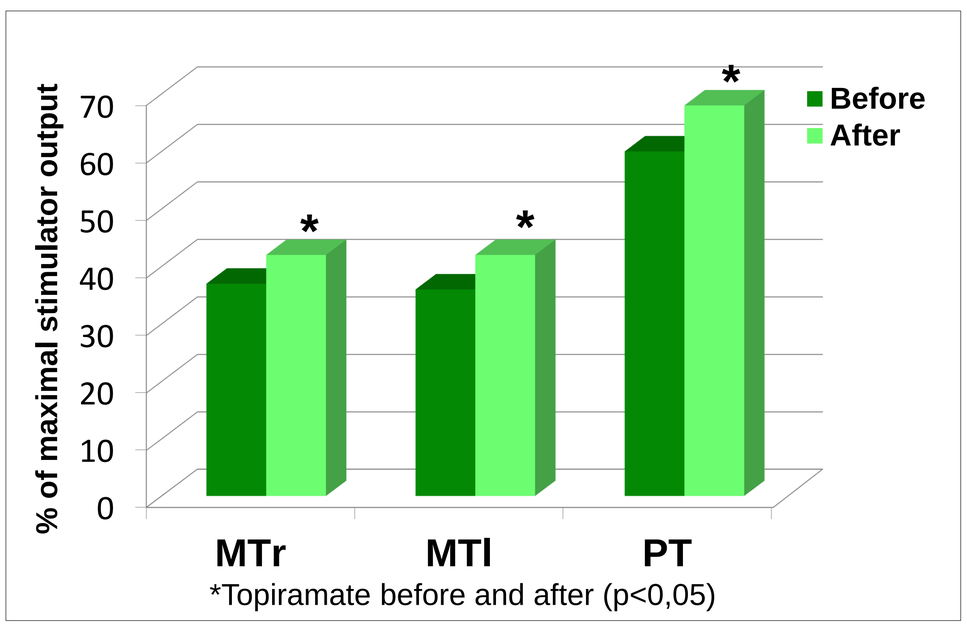
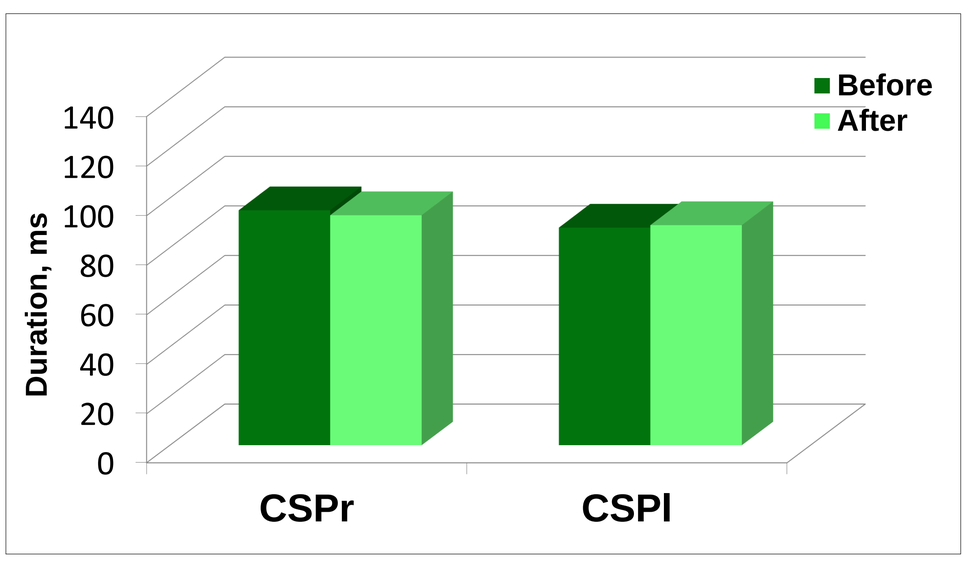


***Figure 1**. TMS parameters in CM patients before/after OnabotA (n=43)*

***Figure 2**. TMS parameters in CM patients before/after Topiramate (n=42)*





Results: After OnabotA, MT r/l and CSP r/l significantly increased compared to baseline (Figure 1). After Topiramate, MT r/l and PT significantly increased compared to baseline (Figure 2). The number of headache days per month decreased significantly in both groups: OnabotA (before 29 days, after 12 days; p<0,01) and Topiramate (before 25 days, after 13 days; p<0,01).

Conclusion: The results of our study showed a combination of significant clinical parameters improvement with TMS parameters changes, reflecting cortical excitability and intracortical inhibition. This suggests that cortical mechanisms in CM "de-chronification" are obligatory involved, independently of primary peripheral (like OnabotA) or central (like Topiramate) action mechanisms.