

# Network functional connectivity and executive dysfunctions in migraine with and without aura

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## Objective

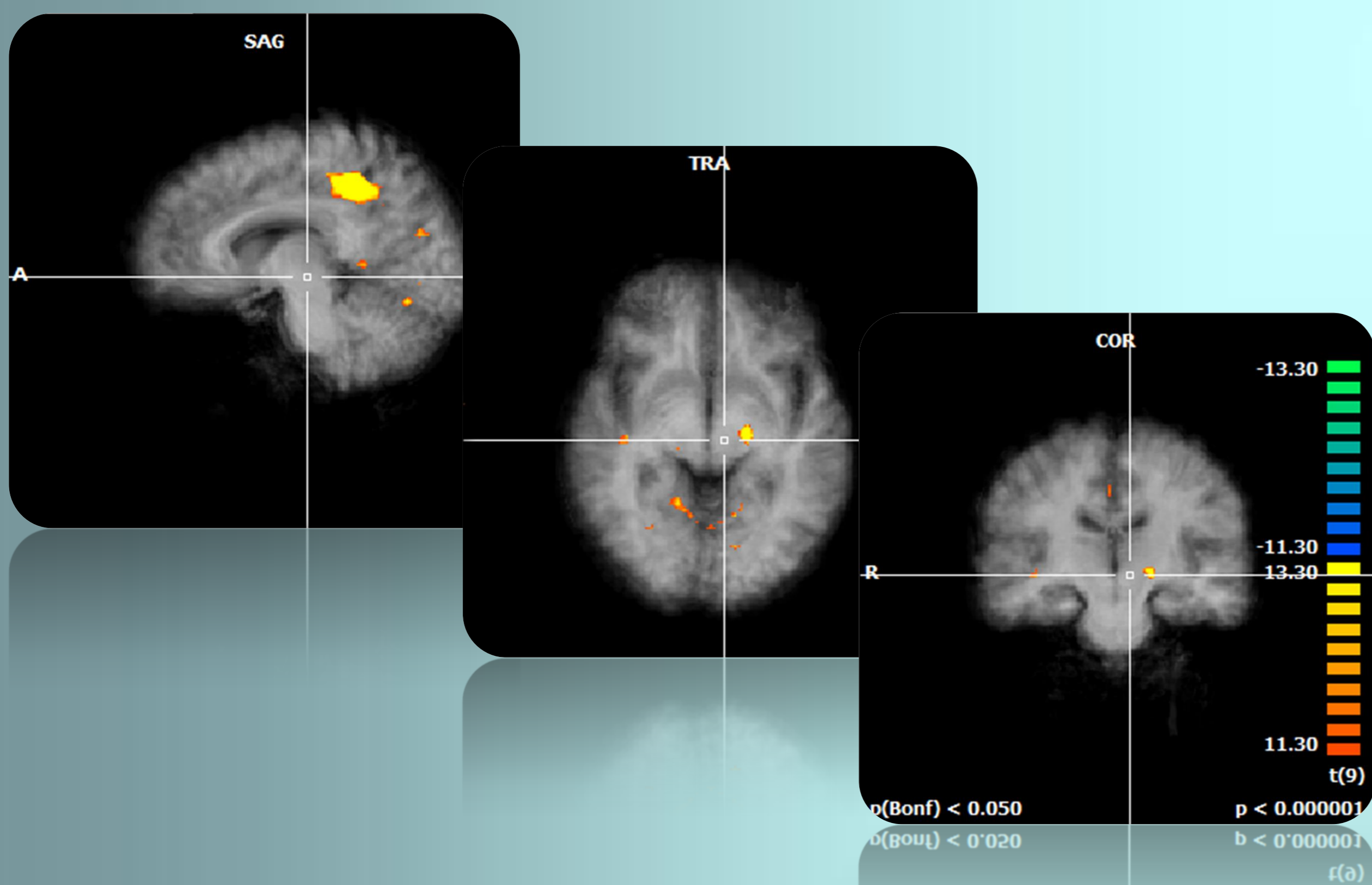
Recent advances in migraine research have shown that cerebral cortex has a primary role in the pathogenesis of migraine<sup>1</sup>. The object of this study was to investigate functional brain connectivity in migraineurs with aura (MA) and without aura (MO) and cognitive dysfunctions<sup>2</sup>.

## Methods

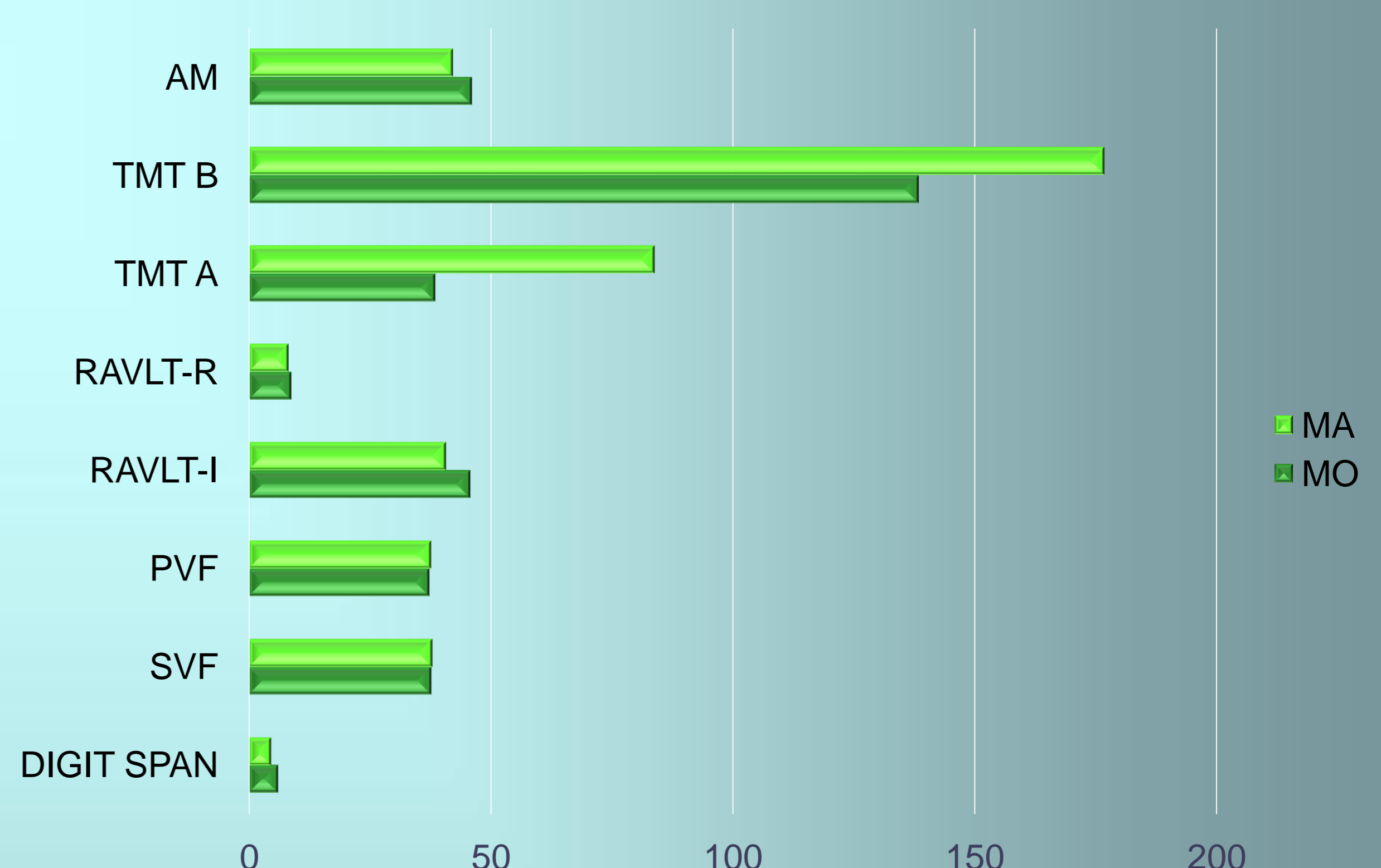
According to the International Headache Society criteria of International Classification of Headache Disorders (ICHD-II, 2004) we recruited 12 migraineurs: 5 MA, 7 MO; 39.17±14.75 years. We acquired resting state fMRI data and extracted individual and group RSN maps respectively using independent component analysis (ICA) and self organizing group-level ICA (sog-ICA). All subjects underwent to a neuropsychological examination (Digit Span, Semantic Verbal Fluency (SVF), Phonemic Verbal Fluency (PVF), Rey Auditory Verbal Learning Test (RAVLT-I; RAVLT-R), Attentional Matrices (AM), Trial Making test – A and B). fMRI data were acquired by using a high-field scanner (Philips Achieva 3TMR).

## Results

The DMN clusters of components were ranked by their mean similarities. Cluster we selected, reveals correlated signal in the medial prefrontal cortex area, ( $p < 0.005$  correct). RS-fMRI data showed that MA compared with MO, had a significant increased functional connectivity in the temporal and parietal areas ( $p < 0.05$ , cluster-level corrected) (Fig. 1). This abnormal network functional connectivity was observed in the absence of structural or microstructural abnormalities and was not related to migraine severity. The neuropsychological examination did not show significant cognitive impairment even if MA and MO had impaired performances in cognitive domain of executive functions (Trail Making test B: MA 176.80±125.17 and MO 118.57±64.54) (Fig. 2).



**Figure 1** Increased functional connectivity in the temporal and parietal areas in RS-fMRI ( $p < 0.05$ , cluster-level corrected).



**Figure 2** Mean scores of neuropsychological examination in MA and MO patients

## Conclusion

Resting state functional connectivity identified brain regions and functional networks with atypical functional connectivity, suggesting that migraine is associated with altered brain functional organization. Specially MO patients seem associated with reduction of functional connectivity. Furthermore, our data showed presence of executive functions deficits in migraine sample but not difference between MA and MO in terms of cognitive performances were noted. Migraine is a brain dysfunction affecting intrinsic connectivity of brain networks. Further investigations should be aimed to clarify the clinical implication of functional connectivity for executive ability and disease therapeutic management.

## References

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2. Liu H, Ge H, Xiang J, Miao A, Tang L, Wu T, Chen Q, Yang L, Wang X, Resting state brain activity in patients with migraine: a magnetoencephalography study, *The Journal of Headache and Pain* 2015, 16:42.