

Theta and Alpha Oscillation Impairments in Autistic Spectrum Disorder Reflect Working Memory Deficit

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Abstract

A dysfunction in the excitatory–inhibitory (E/I) coordination in neuronal assembly has been proposed as a possible neurobiological mechanism of Autistic Spectrum Disorder (ASD). However, the potential impact of this mechanism in cognitive performance is not fully explored. Since the main consequence of E/I dysfunction is an impairment in oscillatory activity and its underlying cognitive computations, we assessed the electroencephalographic activity of ASD and typically developing (TD) subjects during a working-memory task. We found that ASD subjects committed more errors than TD subjects. Moreover, TD subjects demonstrated a parametric modulation in the power of alpha and theta band while ASD subjects did not demonstrate significant modulations. The preceding leads to significant differences between the groups in both the alpha power placed on the occipital cortex and the theta power placed on the left premotor and the right prefrontal cortex. The impaired theta modulation correlated with autistic symptoms. The results indicated that ASD may present an alteration in the recruitment of the oscillatory activity during working-memory, and this alteration could be related to the physiopathology of the disorder.

Working memory; Autism spectrum disorders