Theta waves generate the theta rhythm, a neural oscillatory pattern that can be seen on an electroencephalogram (EEG), recorded either from inside the brain or from electrodes attached to the scalp. Two types of theta rhythm have been described. The "hippocampal theta rhythm" is a strong oscillation that can be observed in the hippocampus and other brain structures in numerous species of mammals including rodents, rabbits, dogs, cats, bats, and marsupials. "Cortical theta rhythms" are low-frequency components of scalp EEG, usually recorded from humans. Theta rhythms can be quantified using quantitative electroencephalography (qEEG) using freely available toolboxes, such as EEGLAB or the Neurophysiological Biomarker Toolbox (NBT).

Impairment of cognitive functions has been reported in prolactinomas. However, the electrophysiological mechanisms of response activation and response inhibition in prolactinomas remain unclear.

Cao et al. recorded participants' scalp electroencephalography (EEG) in a visual Go/Nogo task. Compared to the healthy controls (HCs), the patients demonstrated worse performance, and their prolactin (PRL) levels negatively correlated with behavioral results. Meanwhile, patients' P300 amplitudes in the Go and Nogo conditions were smaller than the HCs. The amplitudes of N200nogo in patients were smaller than the HCs as well. Lower frontal theta power was found in the patients than the HCs in both Go and Nogo conditions, which indicated a deficit in response activation and inhibition. Moreover, the PRL levels mediated the relationship between frontal theta power and behavior performance, implying that lower frontal theta power caused the dysfunction of response control by abnormally high PRL levels. Patients also showed lower occipital alpha power than the HCs, which suggested that the impaired response inhibition may arise from deficient attention control. Taken together, the present study revealed the neurocognitive discrepancies between prolactinomas and the HCs. The frontal theta oscillation was highlighted as the electrophysiological markers of the impaired response control in prolactinomas ¹⁾.

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Cao C, Wen W, Liu B, Ma P, Li S, Xu G, Song J. Theta oscillations in prolactinomas: Neurocognitive deficits in executive controls. Neuroimage Clin. 2020 Sep 30;28:102455. doi: 10.1016/j.nicl.2020.102455. Epub ahead of print. PMID: 33038668.

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