## **Orbitofrontal cortex**



The human orbitofrontal cortex (OFC) is involved in automatic response inhibition and conflict processing, but the mechanism of frequency-specific power changes that control these functions is unknown. Theta and gamma activity have been independently observed in the OFC during conflict processing, while theta-gamma interactions in other brain areas have been noted primarily in studies of memory. Within the OFC, it is possible that theta-gamma phase amplitude coupling (PAC) drives conflict processing.

A study of Chen et al. aimed to characterize the coupled relationship between theta and gamma frequency bands in the OFC during conflict processing using a modified Stroop task.

Eight epilepsy patients implanted with OFC stereotactic electroencephalography (SEEG) electrodes participated in a color-word modified Stroop task. PAC between theta phase and gamma amplitude was assessed to determine the timing and magnitude of neural oscillatory changes. Group analysis was conducted using a non-parametric cluster-permutation t-test on coherence values.

Theta-low gamma (LG) PAC significantly increased in five out of eight patients during successful trials of the incongruent condition compared with the congruent condition. Significant increases in theta-LG PAC were most prominent during cue processing 200-800ms after cue presentation. On group analysis, trial-averaged mean theta-LG PAC was statistically significantly greater in the incongruent condition compared to the congruent condition (p < 0.001, Cohen's d=0.51).

For the first time, OFC theta phase and LG amplitude coupling increases during conflict resolution. Given the delayed onset after cue presentation, OFC theta-LG PAC may contribute to conflict processing after conflict detection and before motor response. This explanation follows the hypothesis that global theta waves modulate local gamma signals. Understanding this relationship within the OFC will help further elucidate the neural mechanisms of human conflict resolution <sup>1)</sup>.

The orbitofrontal cortex (OFC) is a prefrontal cortex region in the frontal lobes in the brain which is involved in the cognitive processing of decision-making. In non-human primates it consists of the association cortex areas Brodmann area 11, 12 and 13; in humans it consists of Brodmann area 10, 11 and 47.

The OFC is considered anatomically synonymous with the ventromedial prefrontal cortex.

Orbitofrontal cortex is associated with many psychiatric disorders. Better anatomical and functional characterization of the orbitofrontal cortex and its connections will improve our knowledge about these diseases <sup>2</sup>.

## **Orbitofrontal Arteriovenous Malformation**

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