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From thalamus to cortex: Exploring the EEG cortical rhythms in dementia with Lewy bodies

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Growing evidences suggest that the thalamus acts as a brain activity pacemaker, regulating the information transmitted to the cortical areas. Particularly, thalamus plays a central role in altering and maintaining arousal. Anatomically its nuclei are topographically organized to modulate and synchronize distributed cortical networks supporting large scale cerebral dynamics related to goal directed behaviors and awareness. On this basis, it was suggested that phenomenal consciousness is generated by synchronized neural activity in thalamic neurons and that thalamic activity is driven by information arising from the cortical computation. Furthermore, the thalamus is critically involved in the modulation of visual transmission to the cortex and also to different cortical areas. It modulates visual attention based on its widespread connectivity with the visual cortex and the fronto-parietal attention network. Abnormal functional connectivity and micro-structural damage within thalami have been reported in dementia with Lewy bodies (DLB). DLB patients present specific symptoms characterized by clouding of consciousness (fluctuating cognition), sleep disturbances (mind-body dissociation) and visual hallucinations (within-mind dissociation), which have all been demonstrated to be associated with abnormalities of thalamic nuclei or thalamo-cortical connectivity of dysfunctions of thalamo-cortical connections in the genesis of DLB clinical features. A relevant role might be played by the thalamus in the physiopathology of core symptoms in DLB. Particularly thalamic cholinergic alterations could be related to fluctuating cognition (FC) and microstructural damage of pulvinar region could be linked to visual hallucinations.

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