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Functional involvement of cerebral cortex in patients with sleep-wake disturbances after traumatic brain injury: a TMS study

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Objective: Sleep-wake disturbances (SWD) are common after traumatic brain injury (TBI); in particular, chronic excessive daytime sleepiness (EDS) is a major, disabling symptom for many patients with TBI. However, the pathophysiological mechanisms remain unclear. Transcranial magnetic stimulation (TMS) represents an useful complementary approach in the study of sleep pathophysiology. We aimed to determine in this study whether post-traumatic SWD are associated with changes in excitability of the cerebral cortex.

Methods: TMS was performed 3 months after mild to moderate TBI, in 11 patients

with subjective excessive daytime sleepiness (defined by the Epworth Sleepiness Scale ≥ 10), 12 patients with objective EDS (as defined by mean sleep latency < 5 on multiple sleep latency test), 11 patients with fatigue (defined by daytime tiredness without signs of subjective or objective EDS), 10 patients with post-traumatic hypersomnia „sensu strictu“ (increased sleep need of > 2 h per 24 h compared to pre-TBI), and 14 control subjects. Measures of cortical excitability included central motor conduction time, resting motor threshold (RMT), short latency intracortical inhibition (SICI) and intracortical facilitation to paired-TMS.

Results: In the patients with objective EDS and hypersomnia, RMT was higher and SICI was more pronounced than in control subjects. In the other patients all TMS parameters did not differ significantly from the controls.

Conclusions: Similar to that reported in patients with narcolepsy, the cortical hypoexcitability may reflect the deficiency of the excitatory hypocretin/orexin-neurotransmitter system.

A better understanding of the pathophysiology of post-traumatic SWD may also lead to better therapeutic strategies in these patients. ■

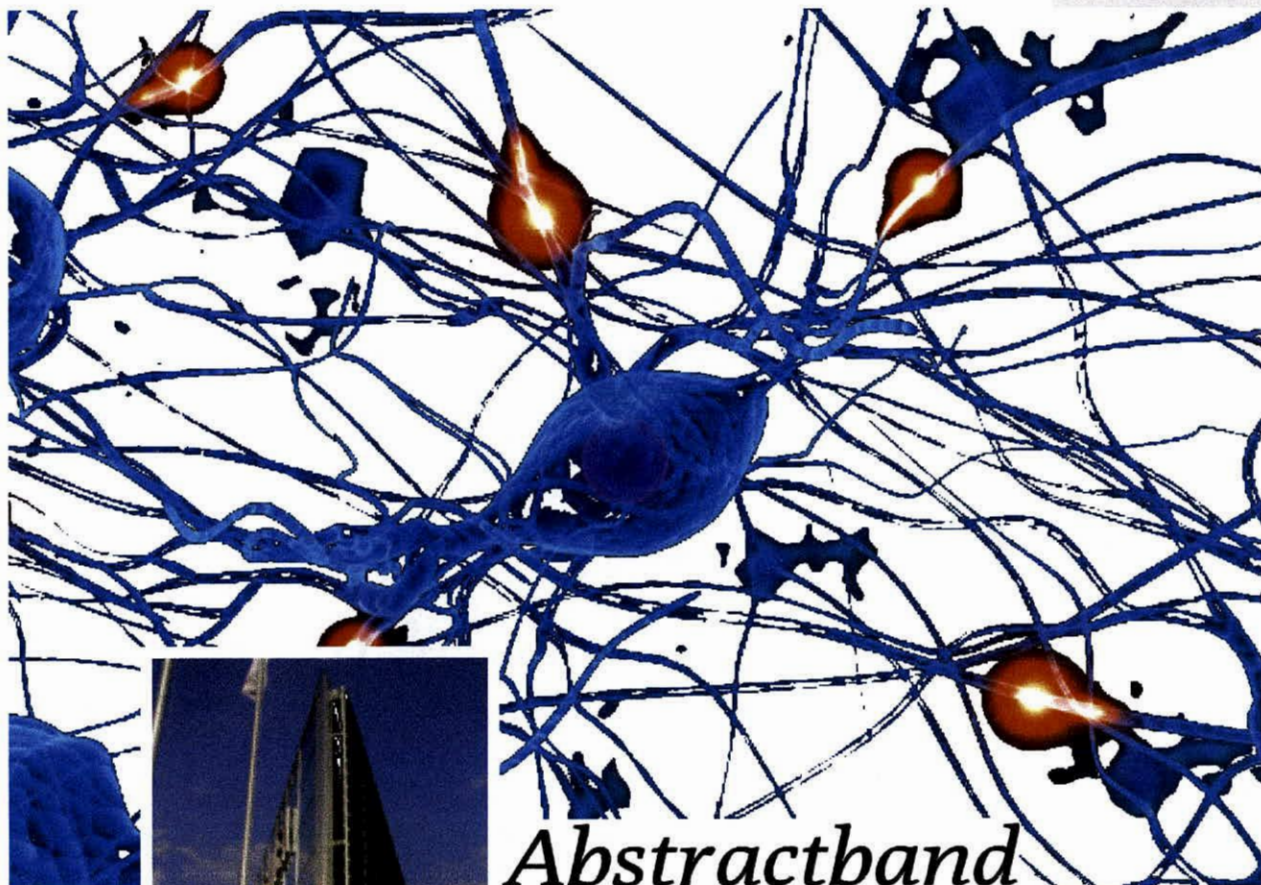
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