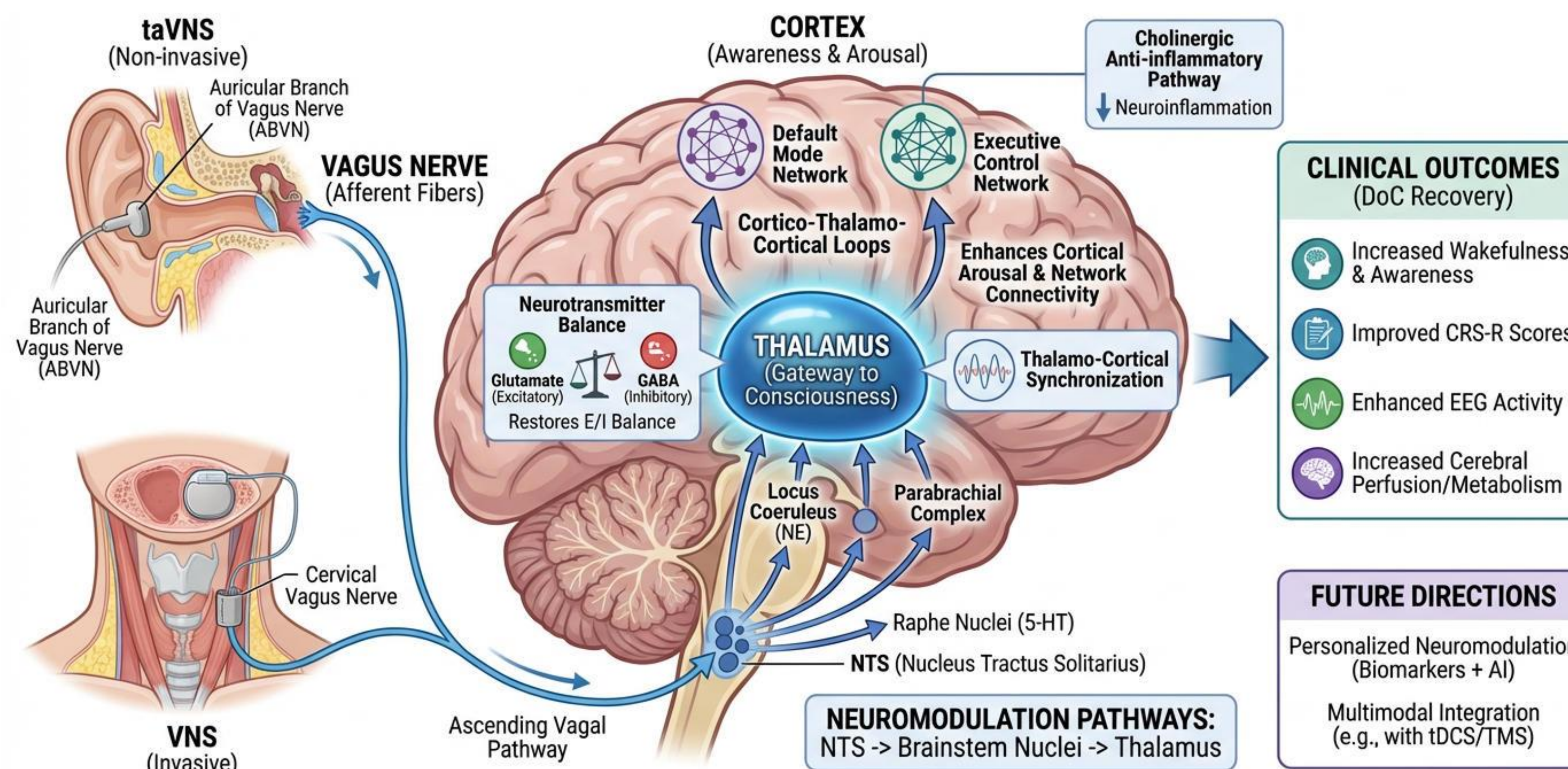


Vagus Nerve Stimulation And Thalamic Connectivity In Disorders Of Consciousness: Current Evidence And Mechanistic Perspectives

Wangxiao Bao. Department of Rehabilitation Medicine, The First Affiliated Hospital, Zhejiang University School of Medicine, Hangzhou, China.

THE THALAMIC-VAGAL AXIS IN DISORDERS OF CONSCIOUSNESS: MECHANISMS & VNS THERAPY



Abstract

Background: Disorders of consciousness (DoC), encompassing conditions such as unresponsive wakefulness syndrome (UWS) and minimally conscious state (MCS), present a significant challenge in clinical neuroscience due to limited therapeutic options and an incomplete understanding of their underlying neuropathology.

Methods: This narrative review integrates up-to-date neuropathological and clinical research to validate the thalamic-vagal axis as a core etiopathogenic model of DoC. We dissect how thalamic dysfunction drives consciousness impairment, and systematically evaluate vagus nerve stimulation (VNS)—especially non-invasive transcutaneous auricular vagus nerve stimulation (taVNS)—as a targeted neuromodulatory therapy for this axis.

Results: Evidence indicates that taVNS can modulate the thalamic-vagal axis, potentially restoring thalamic excitability, rebalancing neurotransmitters, and improving functional connectivity. Clinical data confirms that taVNS leads to behavioral improvements, with notably greater efficacy in patients with MCS compared to UWS, as reflected in increased Coma Recovery Scale-Revised scores.

Conclusion: The thalamic-vagal axis provides a compelling neuropathological model for understanding DoC, and taVNS emerges as a promising therapeutic strategy. However, etiopathogenic heterogeneity and variable treatment responses persist. Future development of biomarker-guided, precision neuromodulation approaches is essential to translate this mechanistic insight into effective, personalized therapies for DoC.