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Cerebral small vessel disease: The impact of glymphopathy and sleep disor...

Cerebral small vessel disease: The impact of glymphopathy and sleep disorders

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Abstract The glymphatic system, a vital brain perivascular network for waste clearance, hinges on the functionality of the aquaporin 4 (AQP4) water channel. Alarming, AQP4 single nucleotide polymorphisms (SNPs) are linked to impaired glymphatic clearance, or glymphopathy, which contributes to sleep disturbances and various age-related neurodegenerative diseases. Despite the critical role of glymphopathy and sleep disturbances in cerebral small vessel disease (CSVD) - a silent precursor to age-related neurodegenerative disorders - their interplay remains underexplored. CSVD is a major cause of stroke and dementia, yet its pathogenesis is not fully understood. Emerging evidence implicates glymphopathy and sleep disorders as pivotal factors in age-related CSVD, exacerbating the condition by hindering waste removal and compromising blood-brain barrier (BBB) integrity. Advanced imaging techniques promise to enhance diagnosis and monitoring, while lifestyle modifications and personalised medicine present promising treatment avenues. This narrative review underscores the need for a multidisciplinary approach to understanding glymphopathy and sleep disorders in CSVD. By exploring their roles, emphasising the necessity for longitudinal studies, and discussing potential therapeutic interventions, this paper aims to pave the way for new research and therapeutic directions in CSVD management.

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