

Stress and the glymphatic system

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Abstract

Psychoneuroendocrinology (PNEI) is an integrative discipline studying the processes by which mental events modulate immune functions and how the immune system in turn can alter brain function. The central nervous system (CNS) is the only system in the body lacking its own anatomically defined lymphatic vessels. The glymphatic system is an adaptation mechanism developed by the CNS for fluid balance and waste clearance. Prolonged exposure to stress – chronic stress, can be detrimental for the functioning of the central nervous system and the glymphatic system. Methods: Electronic databases including PubMed/MEDLINE, Google Scholar, and Scopus were searched for original articles examining stress and its effects on the glymphatic system. Results: Numerous everyday situations can be defined as “stressful” – work environment, exams, physical and psychological stress due to illness, trauma, etc. The body’s response to stress is a combination of adjustments known as “fight-flight-freeze” response – hormonal and physiologic changes helping the body fight a threat or flee to safety. Increase in stress is associated with impaired sleep and considering that the brain’s waste clearing system is shown to be active during sleep, it can be suggested that this is a mechanism in which stress affects glymphatic function. Conclusion: The research on the impact of stress on the glymphatic function is still lacking, but there are clear indications that researching the topic is valuable. It is promising to evaluate if through stress management there can be an improvement in waste-clearing in the brain and the prognosis of diseases characterized by accumulation of metabolites.

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