

Cardiovascular Alterations and Cognitive Decline: Mechanistic Links between Vascular Dysfunction and Brain Health

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RESUMO

Abstract Introduction: Cognitive decline and dementia are major global health challenges, with increasing prevalence driven by population aging. Growing evidence indicates that cardiovascular alterations play a central role in the pathogenesis of cognitive impairment, highlighting the concept of a heart-brain axis. Conditions such as hypertension, atherosclerosis, heart failure, and arterial stiffness have been consistently associated with reduced cognitive performance and increased risk of dementia. **Objective:** To examine the relationship between cardiovascular alterations and cognitive decline, focusing on underlying pathophysiological mechanisms. **Discussion:** Cardiovascular dysfunction contributes to cognitive impairment through multiple interconnected pathways. Chronic hypertension is associated with small vessel disease, endothelial dysfunction, and reduced cerebral perfusion, leading to white matter damage and impaired neuronal function. Atherosclerosis and arterial stiffness further compromise cerebral blood flow and promote ischemic injury. In heart failure, reduced cardiac output results in chronic cerebral hypoperfusion, which has been linked to deficits in memory, attention, and executive function. In addition, vascular dysfunction promotes blood-brain barrier disruption, facilitating neuroinflammation and oxidative stress. Elevated levels of inflammatory mediators, such as TNF- α and IL-6, and increased reactive oxygen species production contribute to neuronal damage and synaptic dysfunction. Metabolic factors commonly associated with cardiovascular disease, including insulin resistance and dyslipidemia, further exacerbate these processes. Epidemiological studies consistently demonstrate that individuals with cardiovascular risk factors have a higher incidence of mild cognitive impairment and dementia, including Alzheimer's disease. Importantly, early vascular changes may precede clinical cognitive symptoms, suggesting a window of opportunity for prevention. **Conclusion:** Cardiovascular alterations are closely linked to cognitive decline through mechanisms involving impaired cerebral perfusion, inflammation, and vascular dysfunction. These findings support integrating cardiovascular and neurological approaches to prevent and manage cognitive impairment. Targeting cardiovascular risk factors may represent a key strategy to reduce the global burden of dementia.

Palavras-chave: Cardiovascular Disease Cognitive Decline Cerebral Perfusion Endothelial Dysfunction Vascular Dementia.