CEREBRAL BLOOD FLOW AND COGNITIVE FUNCTION DURING HEAT STRESS

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Abstract

Climate change has had widespread impacts on humans and natural systems. In recent decades, a number of severe heat waves have occurred throughout the Northern Hemisphere. The frequent occurrence of heat waves or the urban heat island phenomenon poses a significant threat to human health. When exposed to a hot environment for a long time, we feel dizziness or light-headedness. Subsequently confusion, disorientation or staggering occurs in more severe condition. These symptoms indicate orthostatic intolerance or cognitive impairment. A considerable factor of these symptoms is thought to be cerebral blood flow and its regulation, because heat stress reduces cerebral blood flow, which is caused by increased distribution of cardiac output to the cutaneous circulation, profuse sweating, and hypocapnia due to hyperthermia-induced hyperventilation. Hyperthermia-induced central fatigue impairs voluntary force production and neuromuscular function, which is suggestive of a heat-induced impairment in brain function. However, the effect of hyperthermia on cognitive function seems to be equivocal. Reduced orthostatic tolerance and impaired cognitive function during heat stress appears to be caused by cerebral hypoperfusion and/or increased brain temperature, but the contribution remains unknown. I will summarize recent researches regarding to cerebral blood flow focused on orthostatic tolerance and cognitive function during heat stress.

Key words: internal and external carotid artery blood flow, vertebral artery blood flow, electroencephalographic event related potentials, hyperthermia

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