CEREBRAL BLOOD FLOW REGULATION DURING EXERCISE

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Abstract

In contrast to other organs, the traditional thinking is that total cerebral blood flow (CBF) remains relatively constant and is not largely affected by a variety of physiological conditions, including those imposed during exercise. Recent research, however, demonstrated that increases in cerebral metabolism are paralleled by transient increases in internal carotid artery blood flow and middle cerebral artery mean blood flow velocity during dynamic exercise at mild to moderate intensity. This increase in CBF is likely required to meet the metabolic demands of cerebral neuronal activity during exercise, but increases in exercise intensity up to approximately 60% of maximal oxygen uptake produce elevations in CBF, after which CBF decreases toward baseline values. This finding indicates that, during heavy exercise, CBF decreases despite the cerebral metabolic demand. However, the mechanism of exercise induced-modification in CBF regulation remains unclear. In addition, some previous studies suggest that exercise‐induced transient changes in CBF may alter brain function, e.g. cognitive function. In the previous study, we examined whether acute changes in CBF directly affect cognitive function during exercise. During prolonged exercise, cognitive function was improved, despite a decrease in CBF. Also, an acute increase in CBF by hypercapnic stimulation did not affect cognitive function throughout the prolonged exercise. These findings suggest that exercise-induced changes in CBF do not alter cerebral metabolism to preserve cognitive performance. In this symposium, I highlight the integrative mechanisms underlying the regulation of CBF during exercise. In addition, I present some new findings regarding the relationship between CBF regulation and brain function during exercise and suggest avenues for future research.

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He received his PhD in 1999 in Human and Environmental studies from Kyoto University in Japan. He has experiment in the field of cardiovascular/respiratory regulation, especially arterial baroreflex, peripheral vasculature, cerebral blood flow etc. He is also expert in muscle sympathetic nerve activity or baroreflex recording in humans. He published 110 original peer-reviewed papers since 1999.