

The effects of exercise duration on cerebral oxygenation in the human prefrontal cortex at moderate exercise intensity

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Introduction. We have shown that moderate exercise intensity increases cerebral oxygenation in the prefrontal cortex (PFC). However, it is unknown how exercise duration affects cerebral oxygenation in the PFC at moderate intensity. The purpose of this study was to investigate the effect of exercise duration at moderate exercise intensity on oxygenated haemoglobin concentration changes in the human PFC.

Methods. After 10 min rest, 10 healthy young subjects performed cycling exercise on the ergometer at 55% of $\text{VO}_{2\text{max}}$ for 1 hour. Oxyhemoglobin concentration changes ($\Delta[\text{oxyHb}]$) in the PFC and respiratory responses were measured using the near infrared spectroscopy (NIRS) and a metabolic cart, respectively. Blood lactate, glucose, salivary amylase, ratings of perceived exertion (RPE) were also measured.

Results and discussion. Oxygen consumption (VO_2) reached a steady state after 5 min of exercise at moderate intensity. On the other hand, cerebral oxygenation in the PFC reached a steady state 15 min after the start of exercise and maintained this level until the end of exercise. This suggests that respiratory function and cerebral oxyHb in the PFC are not related to each other, although the mechanism underlying the regulatory system of cerebral oxygenation in human PFC during exercise remains unclear.