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Workplace design-related stress effects on prefrontal cortex connectivity and neurovascular coupling

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Abstract

This study aims to evaluate the effect of workstation type on the neural and vascular networks of the prefrontal cortex (PFC) underlying the cognitive activity involved during mental stress. Workstation design has been reported to affect the physical and mental health of employees. However, while the functional effects of ergonomic workstations have been documented, there is little research on the influence of workstation design on the executive function of the brain. In this study, 23 healthy volunteers in ergonomic and non-ergonomic workstations completed the Montreal imaging stress task, while their brain activity was recorded using the synchronized measurement of electroencephalography and functional near-infrared spectroscopy. The results revealed desynchronization in alpha rhythms and oxygenated hemoglobin, as well as decreased functional connectivity in the PFC networks at the non-ergonomic workstations. Additionally, a significant increase in salivary alpha-amylase activity was observed in all participants at the non-ergonomic workstations, confirming the presence of induced stress. These findings suggest that workstation design can significantly impact cognitive functioning and human capabilities at work. Therefore, the use of functional neuroimaging in workplace design can provide critical information on the causes of workplace-related stress.