

Cerebral blood flow changes in the primary motor and premotor cortices during hyperventilation

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The aim of this study was to clarify the regional differences in cerebral blood flow (CBF) change during hyperventilation by using $H_2^{15}O$ and positron emission tomography (PET). Eight healthy volunteers (age: 63.0 ± 8.9 yr.) were studied. Regional CBF was measured by the $H_2^{15}O$ autoradiographic method and PET. Statistical parametric maps (SPM) and conventional regions of interest (ROI) analysis were used for estimating regional CBF differences in the normocapnic state with normal breathing and the hypocapnic state induced by hyperventilation. Total CBF decreased during the hypocapnic state. The SPM revealed that primary motor and premotor cortices were significantly activated by hyperventilation. In these areas absolute CBF values were significantly higher than those in the temporal, occipital and parietal lobes in the hypocapnic state, but there were no significant regional differences in the normocapnic state. In the hypocapnic state induced by hyperventilation, the primary motor and premotor CBF shows combined changes with vasoreaction to hypoxemia and increase in activation due to hyperventilation.

Key words: PET, ^{15}O labeled water, hyperventilation, cerebral blood flow