

Relationship between brain temperature and white matter damage in subacute carbon monoxide poisoned patients

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Introduction: Carbon monoxide (CO) poisoned patients have shown the imbalance between the cerebral perfusion and metabolism after CO exposure and brain temperatures in these patients may change abnormally as a result of the imbalance. In these patients, it has been reported that cerebral white matter (WM) was damaged in the early phase, BT may thus depend on the extent of damage in which brain metabolism should be reduced. Here, we investigated whether BT correlates with WM damage in the subacute CO-poisoned patients.

Methods: In thirteen CO-poisoned patients, proton magnetic resonance spectroscopy and diffusion tensor imaging (DTI) were performed on 3 Tesla magnetic resonance imaging system in the subacute phase after CO exposure. BT was estimated from the chemical shift difference from water (H₂O) to N-acetylaspartate (NAA) signals with the following formula: $T [^{\circ}\text{C}] = 286.9 - 94 \times \Delta(\text{H}_2\text{O} - \text{NAA})$. WM damage was assessed by fractional anisotropy (FA) value, which is calculated from DTI dataset. Correlation was examined by Pearson correlation coefficient with $p < 0.05$. We defined mean \pm 1.96 standard deviations of BT and FA value from the age-matched controls as the normal cut-off values ($p < 0.05$).

Results: Significant correlation was observed between BT and FA ($\rho = 0.6181$, $p = 0.0244$). One of 13 patients showed delayed neuropsychiatric sequelae on Day 27 after CO exposure. DNS patient showed normal BT and significant low FA value, whereas the other 12 patients showed significant high BT and normal FA value (Fig. 1).

Conclusion: BT might associate with degree of WM damage in the subacute CO-poisoned patient.