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Usefulness of cerebral blood flow (CBF) measurements to predict the functional outcome for rehabilitation in patients with cerebrovascular disease (CVD)

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Purpose: The objectives of this study were to (1) elucidate the relationship between the mean CBF in the whole brain (Av.mCBF) before rehabilitation of CVD patients and the BI score before and after rehabilitation, (2) determine whether the efficacy of rehabilitation can be predicted by measurement of the Av.mCBF, and (3) investigate what part of the brain was most important to improving the BI score.
Materials and Methods: The Av.mCBFs in 160 patients with CVD were calculated by Patlak plots with ^{99m}Tc-HMPAO before rehabilitation, and we determined the BI score before and after rehabilitation. Based on the BI scores before and after rehabilitation, patients were divided into four groups: Group A, BI = 100; Group B, $80 \leq BI \leq 99$; Group C, $60 \leq BI \leq 79$; Group D, $0 \leq BI \leq 59$. We evaluated the relationship between the Av.mCBF and BI score before and after rehabilitation.
Results: The Av.mCBF before rehabilitation showed a tendency to be more correlated with the BI score after rehabilitation ($r = 0.414$, $p < 0.0001$) than before rehabilitation ($r = 0.272$, $p = 0.0006$). After rehabilitation, there was a tendency for the Av.mCBF value to increase in direct proportion to the BI score of the group: it was highest in Group A and lowest in Group D. The strongest correlation was found between the frontal lobe regional CBF before rehabilitation and the BI score after rehabilitation ($r = 0.343$, $p < 0.0001$).
Conclusions: Measurement of the Av.mCBF before rehabilitation of CVD patients will permit prediction of the efficacy of rehabilitation. Also the regional CBF of the frontal lobe is most important for improving the BI score.

Key words: ^{99m}Tc-HMPAO, cerebral blood flow, SPECT, cerebrovascular disease, rehabilitation