To conclude, the novel DCS flow-oximeter has been successfully adapted for simultaneous monitoring of CBF and cerebral oxygenation in mouse brains. DCS for mouse CBF measurement correlates well with LDF, and is less susceptible to motion artifacts. With the unique designs in experimental protocols and corresponding fiber-optic probes, the present study has demonstrated high sensitivities of DCS flow-oximeter in detecting the regional/global changes of CBF and cerebral oxygenation in mice undergoing multi-day repeated transient forebrain ischemia (2-minute bi-CCA occlusion). Monitoring of regional cerebral hemodynamics in each of the two hemispheres provides information for evaluating the collateral compensation effects during unilateral CCA occlusion and for potentially estimating the *in situ* neurological deficits and tissue damages. Simultaneous measurements of CBF and cerebral oxygenation allow for comprehensively assessing cerebral ischemia and tissue hypoxia during cerebral arterial occlusion. DCS flow-oximeter measurements permit real-time quantification of cerebral hemodynamic responses to transient forebrain ischemia, which can be used to guide proper arterial occlusion and evaluate the preconditioning effects on brain adaptation to cerebral ischemia. More than 75% CBF reductions were found during bi-CCA occlusions in mice, which may be considered as a threshold to determine a successful bi-CCA occlusion. The longitudinal declines in CBF reductions during the 2-minute short-term I-R challenges indicate that mouse adaptation to cerebral ischemia could be influenced by the repeated preconditioning. Future studies will evaluate TIA-induced injury to brain through applying repeated medium-term I-R challenges (e.g., 10-min bi-CCA occlusions) to mice. The cerebral hemodynamic changes during repeated transient/medium I-R challenges will be compared with pathophysiological consequences (e.g., neurologic deficits, stroke volumes) of stroke manipulated by permanent MCA occlusions. The anticipated correlations between the cerebral hemodynamic responses and physiological consequences would provide deep insights about the preconditioning/TIA mechanism in protection/promotion of stroke.

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