Multi-site laser Doppler flowmetry for assessing collateral flow in experimental ischemic stroke: Validation of outcome prediction with acute MRI

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Résumé en anglais	High variability in infarct size is common in experimental stroke models and affects statistical power and validity of neuroprotection trials. The aim of this study was to explore cerebral collateral flow as a stratification factor for the prediction of ischemic outcome. Transient intraluminal occlusion of the middle cerebral artery was induced for 90 min in 18 Wistar rats. Cerebral collateral flow was assessed intra-procedurally using multi-site laser Doppler flowmetry monitoring in both the lateral middle cerebral artery territory and the borderzone territory between middle cerebral artery and anterior cerebral artery. Multi-modal magnetic resonance imaging was used to assess acute ischemic lesion (diffusion-weighted imaging, DWI), acute perfusion deficit (time-to-peak, TTP), and final ischemic lesion at 24 h. Infarct volumes and typology at 24 h (large hemispheric versus basal ganglia infarcts) were predicted by both intra-ischemic collateral perfusion and acute DWI lesion volume. Collateral flow assessed by multi-site laser Doppler flowmetry correlated with the corresponding acute perfusion deficit using TTP maps. Multi-site laser Doppler flowmetry monitoring was able to predict ischemic outcome and perfusion deficit in good agreement with acute MRI. Our results support the additional value of cerebral collateral flow monitoring for outcome prediction in experimental ischemic stroke, especially when acute MRI facilities are not available.

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