

Cerebrovascular reserve

Cerebrovascular reserve (CVR) refers to the capacity of the brain to increase cerebral blood volume (CBV) to maintain a constant regional cerebral blood flow (rCBF) in the face of low cerebral perfusion pressure (CPP). Regional cerebral blood flow is determined by the ratio of CPP to cerebrovascular resistance by the following formula ^{1) 2)}

$$\text{rCBF} = \text{CPP} / \text{vascular resistance}$$

A study of Rizk et al. of [Cairo](#) aimed to investigate the relationship between [cerebrovascular reserve](#) (CVR) capacity, as measured by single-photon emission computed tomography (SPECT) and collateral blood flow, according to a transcranial colour-coded duplex (TCCD), in patients with symptomatic total carotid occlusion (TCO). Additionally, the study aims to determine whether vascular risk factors have an effect on collateral blood flow, as well as on the CVR.

Thirty-four patients with chronic TCO, diagnosed by carotid duplex scanning and confirmed by other vascular imaging modalities, who had ischaemic symptoms either as stroke or transient ischaemic attack (TIA), were subjected to clinical assessment, SPECT under dipyridamole stress, and grading of cerebral collateral blood flow using TCCD. Demographics and vascular risk factors were correlated with SPECT and TCCD findings.

CVR showed a significant positive correlation with the intensity of collaterals with a p value <0.001 and a Spearman correlation coefficient of 0.686. Hypertension was the only predictor of poor collaterals (p value =0.049; OR =11.5 with 95% CI 1.01-131.16). Smoking was predictive of poor CVR as measured by qualitative SPECT (p value =0.02; OR =13.2 with 95% CI 1.4-120.6).

Cerebral collaterals have an important role in the maintenance of CVR in patients with TCO. Preventive measures should be directed towards hypertension and smoking to preserve cerebral collateral patency and consequently improve CVR in patients with TCO ³⁾.

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