# The relationship between the anatomy of the Circle of Willis and cerebral blood flow volume changes in patients treated due to significant internal carotid artery stenosis

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**Objective:**

In patients with severe Internal Carotid Artery (ICA) stenosis, there are individuals with cerebral blood flow (CBF) higher than (significant compensation - SC), equal to (mild compensation - MC) and lower than (no compensation - NC) in healthy, equally aged population[1,2]. Carotid endarterectomy (CEA) improves cerebral haemodynamics, increasing CBF, especially in patients with its lowest preoperative values[3]. The aim covered assessment of the influence of Circle of Willis (CoW) anatomy on preoperative CBF values and its postoperative changes.

**Methods:**

Study group included 24 symptomatic patients (10 female, 14 male) with >70% ICA stenosis, qualified for CEA. CBF (sum of the flow volumes in internal carotid, external carotid, vertebral arteries) was assessed in DUS preoperatively and 2-3 days after revascularization. Compensatory status was assessed based on published reference values[1]and preoperative CBF. Anatomy of the CoW was assessed preoperatively in the Angio-CT scan and correlated with preoperative CBF and its postoperative changes.

**Results:**

Preoperatively 1 patient had SC and incomplete CoW (hypoplastic right and aplastic left posterior communicans artery - PComA).

9 patients had MC 3 with complete and 6 with incomplete CoW (3 aplasia of left 2 of right PComA, 1 hypoplasia of right and 1 of left PComA, 2 hypoplasia of anterior communicans artery AComA).

14 patients had NC 1 had complete and 13 incomplete CoW (2 hypoplasia of the right posterior cerebral artery - PCA, 4 hypoplasia of the left anterior cerebral artery - ACA, 8 hypoplasia of right and 5 of left PComA, 2 aplasia of left PComA, 1 aplasia of AComA).

The average postoperative CBF increase was -10 ml/min in patient with preoperative SC, 55 ml/min (from 843,25 to 898,25 ml/min) in preoperative MC, and 130,75 ml/min (from 651,25ml/min to 782 ml/min) in preoperative NC group.

**Conclusion:**

CoW anatomy is not correlated with preoperative CBF and its postoperative changes.