

## **Postoperative cortical neural loss associated with cerebral hyperperfusion and cognitive impairment following carotid endarterectomy: <sup>123</sup>I-iomazenil SPECT study**

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### **Abstract**

#### **Background and Purpose**

While cerebral hyperperfusion following carotid endarterectomy (CEA) often impairs cognitive function, magnetic resonance imaging does not always demonstrate structural brain damage associated with postoperative cognitive impairment. The purpose of the present study was to determine whether postoperative cortical neural loss, which can be detected by <sup>123</sup>I-iomazenil (IMZ) single-photon emission computed tomography (SPECT), is associated with cerebral hyperperfusion following CEA and whether it correlates with postoperative cognitive impairment.

#### **Methods**

In 60 patients undergoing CEA for ipsilateral ICA stenosis (> 70%), cerebral blood flow (CBF) was measured using *N*-isopropyl-*p*-[<sup>123</sup>I]-iodoamphetamine SPECT before and immediately after CEA and on the third postoperative day. The distribution of benzodiazepine receptor binding potential (BRBP) in the cerebral cortex was assessed using <sup>123</sup>I-IMZ SPECT before and one month after surgery and was analyzed using three-dimensional stereotactic surface projection. Neuropsychological testing was also performed preoperatively and at the first postoperative month.

#### **Results**

Post-CEA hyperperfusion (CBF increase >100% compared with preoperative values) and postoperative cognitive impairment were observed in 9 patients (15%) and 8 patients (13%), respectively. Post-CEA hyperperfusion was significantly associated with postoperative hemispheric reduction of BRBP (95% CIs, 2.765 to 148.804; *p* = 0.0031). Post-CEA hyperperfusion (95% CIs, 1.183 to 229.447; *p* = 0.0370) and postoperative hemispheric reduction of BRBP (95% CIs, 1.003 to 77.381; *p* = 0.0496) were also significantly associated with postoperative cognitive impairment.

#### **Conclusions**

Cerebral hyperperfusion following CEA results in postoperative cortical neural loss that correlates with postoperative cognitive impairment.