Analgesia by electrostimulation of the trigeminal ganglion in patients with trigeminopathic pain: a PET-activation study

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Purpose: Electrostimulation of the trigeminal ganglion (TGES) has shown good results in the treatment of trigeminopathic pain in selected patients. To map the mechanisms of TGES analgesia, we determined changes in relative regional cerebral blood flow (rCBF) in ten patients with trigeminopathic pain using positron emission tomography (PET).

Method: 10 patients with one-sided trigeminopathic pain (6 left, 4 right-sided, 6 female, 4 male, age 31-75 years) were included after implantation of a stimulation-electrode at the ipsilateral Gasserian Ganglion (Medtronic Itrel III) had been performed at least 3 months earlier. Patients were scanned before stimulation (habitual pain), after short-term stimulation (1 minute stTGES) and after long-term stimulation (ltTGES).

Results: Highly significant pain relief was reported after ltTGES (p 0.006). Relative changes in rCBF after stTGES, which was without significant pain relief, were attributed mainly to intrinsic TGES effects. Statistical comparison of the subtraction images of ltTGES and stTGES disclosed significant increases in rCBF (p 0.001) after ltTGES in perigenual parts of anterior cingulate cortex (ACC) and neighbouring orbitofrontal and medial frontal cortex. Regression analysis of rCBF changes and subjective ratings of pain revealed an inverse relationship in the ipsilateral perigenual ACC and only rCBF changes in the posterior part of the contralateral ACC were consistent with the encoding of pain.

Conclusions: The results of the present study provide evidence for a pain modulating role of the perigenual ACC, critically important in electrostimulation-induced analgesia and identifies the posterior ACC as a region encoding pain sensation.