# SURGERY AND INTROPERATIVE MONITORING IN PARALIMBIC AND LIMBIC GLIOMAS

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There are numerous reciprocal connections between the insula and the temporopolar, entorhinal, perirhinal and the orbitofrontal cortex, and the cingulum and the amygdala. These are indicative of its role as a relay station for important autonomic functions and motor and sensory control and multisensory integration and self-consciousness. In addition, there is integration of language function, behavioural control, language, memory, olfaction and gustation and pain perception and the generation of bliss.

Insular gliomas may grow along these existing fibre tracts, and certain glial entities may follow embryological pathways of neuronal progenitor cells of connected (para)limbic structures. This explains the involvement of whole pathways and (para)limbic systems in large insular gliomas, i.e. via the uncinate fascicle towards the anterior medial temporal lobe, or via the temporal stem towards the orbitofrontal and the frontotorbital cortex, and via the arcuate fascicle towards the language areas.

Insular gliomas are classified i.e. according to Yasargil, with type 3 (a-c) tumors being located in the insula itself, and type 5 tumors extending anteriorly and mesiotemporobasally (5a), anteriorly and frontoorbitally (5b), frontoorbitally and mesiotemporally (5c), or bilaterally (5d). Large insular gliomas should be differentiated from large mesiotemporal gliomas extending in the insula. The latter may be categorized using another classification, originating from epilepsy surgical patient collectives.

Surgery of (para)limbic gliomas is life-prolonging, yet demanding, and it requires profound anatomical understanding - structurally and functionally. Neuropsychological exams show new postoperative deficits in app. 50% of patients, with many of those remaining temporary. The rate of permanent motor or language deficits is in the range of 10%. Many of these permanent deficits are derived from vascular incidents rather than from direct and inadvertent resection of eloquent brain tissue. New (functional) imaging technology and neuropsychological testing helps to understand the preoperative situation and should be integral part of insular glioma surgery. Navigation and neurophysiological monitoring, including subcortical stimulation have been shown to reduce surgical morbidity and long-term neurological deficits and should thus be considered essential tools for a modern surgeon of insular gliomas. Recent developments in examining and monitoring self-consciousness and heartbeat might enlarge diagnostic and therapeutic options in these complex tumours.