Resting-state functional magnetic resonance for glioma surgery

Resting-state functional magnetic resonance imaging in glioma surgery likely reflects similar neural information as detected with intraoperative direct electrocortical stimulation (DES), but in its current form does not reach the spatial resolution of DES. [1].

A study represents a systematic review of the insights provided by resting-state functional MRI (rs-fMRI) use in the glioma population. Following PRISMA guidelines, 45 studies were included in the review and were classified in glioma-related neuronal changes (n=28) and eloquent area localization (n=17). Despite the heterogeneous nature of the studies, there is considerable evidence of diffuse functional reorganization occurring in the setting of gliomas with local and interhemispheric functional connectivity alterations involving different functional networks. The studies showed evidence of decreased long-distance functional connectivity and increased global-local efficiency occurring in the setting of gliomas. The tumor grade seems to correlate with distinct functional connectivity changes. Overall, there is a potential clinical utility of rs-fMRI for identifying the functional brain network disruptions occurring in the setting of gliomas. Further studies utilizing standardized analytical methods are required to elucidate the mechanism through which gliomas induce global changes in brain connectivity [2].

1)
van Lieshout J, Debaene W, Rapp M, Noordmans HJ, Rutten GJ. fMRI Resting-State Connectivity between Language and Nonlanguage Areas as Defined by Intraoperative Electrocortical Stimulation in Low-Grade Glioma Patients. J Neurol Surg A Cent Eur Neurosurg. 2021 Feb 22. doi: 10.1055/s-0040-1721757. Epub ahead of print. PMID: 33618418.
2)
Ghinda DC, Wu JS, Duncan NW, Northoff G. How much is enough-Can resting state fMRI provide a demarcation for neurosurgical resection in glioma? Neurosci Biobehav Rev. 2018 Jan;84:245-261. doi: 10.1016/j.neubiorev.2017.11.019. Epub 2017 Dec 2. PMID: 29198588.