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Oncological and functional neurosurgery: Perspectives for the decade regarding diffuse gliomas

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Abstract

For decades, diffuse glioma (DG) studies mostly focused on oncological considerations, whereas functional outcomes received less attention. Currently, because overall survival has increased in DG, especially in low-grade glioma (overall survival > 15 years), quality of life including neurocognitive and behavioral aspects should be assessed and preserved more systematically, particularly regarding surgery. Indeed, early maximal tumor removal results in greater survival in both high-grade and low-grade gliomas, leading to propose "supra-marginal" resection, with excision of the peritumoral zone in diffuse neoplasms. To minimize functional risks while maximizing the extent of resection, traditional "tumor-mass resection" is replaced by "connectome-guided resection" conducted under awake mapping, taking into account inter-individual brain anatomo-functional variability. A better understanding of the dynamic interplay between DG progression and reactional neuroplastic mechanisms is critical to adapt a personalized multistage therapeutic strategy, with integration of functional neurooncological (re)operation(s) in a multimodal management scheme including repeated medical therapies. Because the therapeutic armamentarium remains limited, the aims of this paradigmatic shift are to predict one/several step(s) ahead glioma behavior, its modifications, and compensatory neural networks reconfiguration over time in order to optimize the onco-functional benefit of each treatment - either in isolation or in combination with others - in human beings bearing a chronic tumoral disease while enjoying an active familial and socio-professional life as close as possible to their expectations. Thus, new ecological endpoints such as return to work should be incorporated into future DG trials. "Preventive neurooncology" might also be envisioned, by proposing a screening policy to discover and treat incidental glioma earlier.

Keywords: Awake mapping; Diffuse gliomas; Overall Survival; Quality of life; Surgery.

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