

SLA of neurosurgeons in Europe and their opinion regarding potential neuro-oncological indications. Furthermore, we investigated treatment preference and variability for three exemplar neuro-oncological cases and disposition to refer for SLA.

Material and methods: A survey comprising 26-questions was mailed using an online survey program (www.surveymonkey.com) to members of the EANS neuro-oncology section. We also presented three exemplar clinical cases of a deep-seated glioblastoma, a recurrent metastasis and a recurrent glioblastoma. Descriptive statistics was applied to report results.

Results: 108 respondents from 27 European countries completed all the questions. Recurrent glioblastoma and recurrent metastases were regarded as the most feasible indications for SLA (chosen respectively by 69% and 58% of the respondents) followed by newly diagnosed high-grade glioma's (31%) and brain metastases (29%). Seventy percent of respondents would refer patients for SLA. We found a limited variability in the clinical practice among respondents for three exemplar clinical cases. The majority of respondents would consider SLA as a treatment option for all three presented cases (80% for the deep-seated glioblastoma case, 64% for the recurrent metastasis case and 76% for the recurrent glioblastoma case). Among respondents who wouldn't consider SLA, preference for standard treatment and lack of clinical evidence were reported as the biggest concerns.

Conclusions: Most of respondents would consider SLA as a treatment option for recurrent glioblastoma, recurrent metastases and newly diagnosed deep-seated glioblastoma. It is important to stress that at the moment the current evidence to support this trend is very low and comparative prospective trials are needed to support the use of SLA and determine proper indications.

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CIRCULATING EXTRACELLULAR VESICLES AS A NOVEL TOOL FOR THERAPY MONITORING OF BRAIN TUMOR PATIENTS

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Objective: Extracellular vesicles (EVs) represent a population of lipid bilayer nanoparticles released by all cell types, including tumor cells, and have recently garnered attention as mediators of intercellular communication. Given the critical need for a reliable biomarker in the therapy monitoring of glioblastoma patients, EVs are of translational interest as they harbor tumor-specific nucleic acids and proteins, transgress the blood-brain-barrier and thus may serve as a noninvasive resource for liquid biopsy. The aim of this study was to investigate the potential of circulating EVs to mirror therapy efficacy and tumor progression.

Methods: We collected plasma samples from glioblastoma (n=40) and meningioma patients (n=25) before, as well as on the first and fourth day after, microsurgical tumor resection. Follow-up samples were obtained every 3 months. Additionally, we analyzed a group of healthy donors (n=18). EVs were isolated by Ultracentrifugation and the plasma concentration was measured by Nanoparticle Tracking Analysis (NTA). Tumor burden was measured on T1-weighted and FLAIR MRI images.

Results: Prior to surgery circulating EVs in glioblastoma and meningioma patients are elevated compared to healthy controls (2-fold increase in meningioma, 5-fold increase in GBM; $p < 0.0001$). After surgery EVs concentration decreased significantly. For glioblastoma patients, EVs dropped by a factor of 7 until the fourth day after tumor resection ($p < 0.001$). A massive drop in EVs was associated with a more radical surgical resection ($p < 0.05$). Interestingly, at the time of tumor recurrence, the number of circulating EVs increased again in all patients during a follow-up period of 9 months.

Conclusion: Our findings highlight the potential of circulating extracellular vesicles as a resource for monitoring treatment response of glioblastoma patients, as they seem to reflect the presence of a tumor mass and thus may assist in clinical decision making.

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TUMOR-TREATING-FIELDS THERAPY MAY INFLUENCE THE CEREBROSPINAL FLUID SHUNT VALVE SETTINGS IN PATIENTS WITH HIGH-GRADE GLIOMA

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Background: Tumor-treating-fields (TTF) has gained popularity as an additional therapy in patients with glioblastoma (GBM). At the same time, some patients with GBM require additional implantation of a programmable cerebrospinal fluid shunt. Data on the possible interference between both devices is scarce. The aim of this study is to investigate whether TTF may affect the shunt valves.

Methods: A retrospective analysis of all of patients with TTF Therapy between 2016 and 2020 was performed. Patients with cerebrospinal fluid (CSF) shunt systems were further analysed with regards to a valve setting alterations or malfunction.

Results: 22 consecutive patients (5 female, 17 male; age median±SD 53±16.1 yrs) were identified. Of those, 15 patients underwent surgical resection and 7 where biopsied. All patients were received adjuvant radiotherapy and temozolomide. Three patients received ventriculo-peritoneal (VP) shunts. In one patient, pressure setting of the CSF valve changed spontaneously and caused under-drainage during TTF treatment. Despite downregulation under fluoroscopy, hydrocephalus persisted, ultimately leading to revision surgery.

Conclusion: TTF may influence programmable values in VP-Shunt. A routine examination of the valve setting may be warranted in these patients during the TTF treatment.

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LONGITUDINAL ANALYSIS OF T2-IMAGING PATTERN REFLECTS CLINICAL COURSE OF ASTROCYTOMA

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Background: In contrast to IDH-wt astrocytomas IDH-mut astrocytomas represent a subgroup of glioma with a more favorable outcome. However, therapeutic approaches at recurrent stages still remain unclear. Interpretation of each MRI in follow-up examinations becomes challenging due to the non-linear growth behavior. Here, we aim to explore common growth patterns and to predict treatment responses.

Methods: Between 2000 and 2018 volumetric diversity of astrocytomas and computed T2-imaging patterns based on segmentation of 7995 follow-up MRI scans of 48 eligible patients diagnosed with IDH-mut astrocytomas were analyzed. For tumor segmentation the NORA software tool, developed by the Department of Neuroradiology at University of Freiburg has been used. Data analysis was performed by a recently published computational pipeline.

Results: The identified growth patterns of IDH-mut astrocytomas revealed highly dynamic changes, which were patient-specific and did not directly correlate with clinical parameters or therapeutic interventions. Three major subgroups were identified based of the peak growth maximum at early, middle or late stage of the disease. We observed that frontal tumors belonged to a subgroup with large tumors at initial diagnosis. An extent of resection above 72.4% of the T2-hyperintense regions was required to show an improvement in overall survival. Investigations of the optimal timepoint for surgical interventions suggest a more beneficial effect at initial diagnosis for WHO^{III} tumors. In WHO^{II} tumors, no difference between initial surgery after radio/chemotherapy was found. Surgical resection was found to be beneficial regardless of the WHO grade.

Conclusion: Our findings suggest, that patients suffering from IDH-mut astrocytomas show highly dynamic growth behavior with a large inter-patient variability. WHO^{III} IDH-mut astrocytomas showed improved survival by early surgical intervention while the timepoint of surgical intervention was unessential for WHO^{II} tumors. These findings open the possibility for neoadjuvant treatment options for IDH-mut WHO^{II} astrocytomas in the future.