from 2nd line treatment was 11 months, median OS was 31 months. 10 LGG patients were identified with a median survival from 2nd line treatment of 12 months and median OS was 61.5 months. Conclusion Re-irradiation is a safe and feasible treatment. The majority of patients experienced an improvement in PS after treatment. However in this small, retrospective study there was no signal that reirradiation was associated with improved survival when compared with similar cohorts managed without reirradiation.

RADIOSURGERY FOR MALIGNANT MELANOMA BRAIN POLYMETASTASIS

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PURPOSE: To compare the outcomes following Cyberknife radiosurgery (SRS) to patients with malignant melanoma with solitary metastasis (SM), oligometastasis (2–4 metastases (OM)) and polymetastasis (>4 metastases (PM)) within a departmental philosophy of whole brain radiotherapy avoidance for melanoma brain metastases. **METHODS:** NHS England selection criteria were used. All target volumes were approved by a consultant neuro-radiologist and no planning target volume was used. Thirty-nine patients (SM=18, OM=14, PM=7) were treated June 2013–June 2016. In total 130 individual metastases were treated of which 15 were metachronous following initial SRS. Seven lesions were treated with 3 fractions (24–30Gy), 123 lesions received a single fraction (15–24Gy). The endpoints for this study were lesional control (LC), distant brain control (DBC) and overall survival (OS). **RESULTS:** For all lesions at 6 months: LC 88%, DBC 72%, OS 77% and at 12 months LC 74%, DBC 50%, OS 50%. DBC at 6 months: SM 92%, OM 47%, PM 80% and at 12 months SM 71%, OM 23%, PM 45%. OS at 6 months: SM 86%, OM 67%, PM 85% and at 12 months SM 79%, OM 28%, PM 57%. **CONCLUSIONS:** Whilst outcomes for SM are as expected, treatment of PM appears feasible and there may be a self selecting subgroup of patients with small volume PM who benefit from SRS in the biological/immune therapy era. The apparent lower rate of DBC and OS with OM and the effect of both lesional volume and biological/immune therapy history will be discussed.

HOLISTIC NEEDS ASSESSMENT IN BRAIN CANCER PATIENTS: A SYSTEMATIC REVIEW OF AVAILABLE TOOLS

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BACKGROUND: A diagnosis of brain cancer affects nearly 10 000 adults per year in the United Kingdom and has a devastating impact. This is due to the poor prognosis as well as a significant symptom burden, which often includes neurocognitive deficits. It is essential, therefore, to have a comprehensive way to determine the needs of these patients. Holistic Needs Assessment (HNA) is widely used for other cancers, and is recommended for brain cancers. The aim of this study was to identify brain specific patient reported outcome measures and investigate the potential of these for HNA. **METHODS:** We searched four databases (Medline, CINAHL, BNI and Psycinfo), with no date limits, for studies published in English, and identified 1004 studies. After review, eight studies fulfilled our inclusion criteria; these reported the development of tools developed for a brain cancer population for use in a clinical setting and assessed more than one domain of need. COSMIN criteria, which have been developed through consultation with 57 experts, were used to assess the psychometric properties and they were also assessed against criteria for HNA. **RESULTS:** The studies which were included, reported the development of four tools. Two tools were developed as symptom assessment tools; the MD Anderson Symptom Inventory – Brain Tumor Module (MDASI-BT); and the National Comprehensive Cancer Network/Functional Assessment of Cancer Therapy-Brain Symptom Index (NFBST-24), which both demonstrated evidence of good or fair psychometric properties but would need further development to be used in HNA. The Supportive Care Needs Survey 34 plus brain subscale (SCNS34-B) and Brain Patient Concern Inventory (PCI) were developed as HNA tools but lacked psychometric testing. **CONCLUSION:** While some progress has been made in the development of tools, the results indicate that no tools are adequate without further development for HNA assessment in brain cancer.

DIFFUSION-WEIGHTED IMAGING AND MRI-BASED FRACTAL ANALYSIS AS QUANTITATIVE METRICS FOR PREOPERATIVE PREDICTION OF ATYPIA IN MENINGIOMAS.

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PURPOSE: The purpose of this study was to use fractal MR analysis and diffusion-weighted imaging (DWI) to determine if either can reliably

differentiate WHO I benign from atypical WHO II meningiomas. **METHODS:** 27 patients with atypical meningioma (WHO II) and 27 patients with benign meningioma (WHO I) were recruited from an institutional database (54 patients: 34 female, 20 male, mean age 62 +/- 15 yrs). All patients had standard contrast-enhanced preoperative brain MR exams including DWI. Mean diffusivity was quantified for tumor core using GE and Philips Workstations. Fractal analysis with box-count method was performed on post-contrast images to determine average (FDa) and maximum (FDM) fractal dimension of the enhancing portions of the tumor, and Image J1.49 software was used for MR fractal analysis. **RESULTS:** Mean diffusivity did not differ significantly from these two groups. Isointensity of signal was significantly associated with WHO I meningiomas (odds ratio 0.17; 95% CI .44-.62, $p < .008$). Ki-67 was significantly higher in atypical meningiomas than the benign group ($p < .0001$). Both the FDa and FDM were significantly higher in the atypical groups ($p < .0001$) and correlated with the Ki-67 index. Multivariate regression model using MR Fractal analysis and DWI isointensity reached significance, $P = .001$ and AUC 0.87 (95% CI 0.74–0.94). Maximum fractal dimension, FDM, > 1.31 was a significant predictor of atypical WHO II meningioma (OR 12.30, $p < .02$). Mean diffusivity and signal characteristics on DWI were not reliable predictors of WHO II atypical meningioma. **CONCLUSION:** Tumor fractal dimension analysis on preoperative MR appears to reliably correlate with atypical WHO II meningioma. Mean diffusivity does not reliably distinguish WHO I from WHO II meningioma but isointensity of signal seems to significantly correlate with WHO I meningioma.

OVEREXPRESSION OF HEXOKINASE 2 IS EPIGENETICALLY REGULATED BY FREQUENT HYPOMETHYLATION IN GLIOBLASTOMA MULTIFORME

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HK2 has a prominent role in glycolysis, acting as the rate-limiting step in the pathway. HK2 is highly expressed in many cancers, with overexpression associated with drug resistant phenotypes. In parallel, its inhibition has improved the effectiveness of anticancer agents. Evidence indicates that HK2 is epigenetically silenced in normal tissue, and hypomethylation is the driving factor of increased expression in tumours, suggesting HK2 as a potential genetic modifier and therapeutic target. This study determines the role of methylation and its association with expression levels of HK2 in glioblastoma multiforme (GBM) fresh frozen biopsies and patient-derived GBM short-term cultures, by pyrosequencing and quantitative PCR. Anti-proliferative effects of HK2 inhibitors and their mechanism of action was investigated by cytotoxicity assays and FACS analysis. Hypomethylation was seen in all GBM biopsies ($n=85$) compared to normal brain tissue; average methylation of 4.6% compared to 26% respectively ($p < 0.0001$). Hypomethylation was also in all culture samples ($n=9$). An increase in HK2 expression was detected, ranging between 6 to >1000 fold change in GBM biopsies ($n=50$) and 30 to >1000 in cultures ($n=10$), compared to normal brain tissue. There was a strong correlation between methylation and level of expression ($p < 0.0001$) as biopsies with HK2 expression greater than the mean fold change additionally displayed hypomethylation levels below $<3\%$ methylation. The anti-proliferative effects of the HK2 inhibitor bromopyruvic acid (BPA) were determined in GBM cultures ($n=12$). BPA induced anti-proliferative effects and increased apoptotic levels in cultures. Elevated expression of HK2 ($>$ mean fold change) was associated with greater sensitivity to BPA. Significantly higher levels of apoptosis were induced after treatment with BPA at ID50 in cultures expressing high HK2 ($>$ mean fold change) ($p < 0.0014$). This study establishes a strong correlation between hypomethylation and increased expression of HK2. Furthermore, demonstrating the potential of HK2 inhibitors as a novel therapy in a significant subset of GBM.

MENINGIOMAS: BRAIN INVASION AS A MARKER FOR CLASSIFICATION

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OBJECTIVES: Brain invasion in meningiomas is considered a significant prognostic factor, as suggested by the most recent WHO classification on brain tumours. In the present study, we review the impact of brain invasion on the grading, treatment protocols and prognosis of meningiomas in a general neuro-oncology practice. **METHODS:** Retrospective analysis of data from 2008 until 2016 using the electronic record system used in our institution. We collected data on the overall number of patients with grade I, II and unclassified grade, gender, year of operation, presence of brain invasion or not, Simpson grading and treatment following surgery. **RESULTS:** 512 patients with meningiomas grade I, II and unclassified grading were identified. Brain invasion was reported in 10.9%, no invasion in 88.5% and probable invasion was reported in 3.51% of all patients. Of the latter group 23.5% were reported as grade I, 41.2% as grade II and 35.3%