Pencer Brain Tumor Centre, Departments of Hematology Oncology, Neurology, Psychosocial Oncology and Palliative Care, Princess Margaret Cancer Centre; Neurology, Psychiatry, Tanz Centre for Research in Neurodegenerative Disease, University of Toronto, Ontario

Introduction: Cognitive impairment and personality changes following brain tumors may be due to frontal network disruption. The effects of different tumor components such as residual tumor size, gliosis, edema and encephalomalacia on frontal behavior syndromes is unknown. The aim of our study was to determine the relation between tumor components and apathy, disinihibition and executive dysfunction, using the FrSBe, a standardized rating scale. Methods: 31 brain tumor patients who completed the FrSBe were included. Questionnaires were scored and raw scores converted to T-scores (mean 50, SD 10) according to published norms. Using OsiRIX, brain lesions were manually segmented on the Fluid attenuated inversion recovery (FLAIR) sequence into residual tumor, gliosis, edema and encephalomalacia. Spearman correlations were used to determine the relationship between tumor components and frontal behaviors as measured by FrSBe scores. Results: Clinically significant levels of Apathy were endorsed on the patient self-report and family-rating scales of the FrSBe (mean T-score□ SD: 65.19□ 17.28 and 68.75□ 17.57, respectively). Self-reported Executive Dysfunction was also clinically significant (68.16□ 14.63). Encephalomalacia was positively correlated with family ratings of Apathy ($r=0.491$; $p<0.045$), Disinhibition ($r=0.532$; $p<0.034$), and Executive Dysfunction ($r=0.583$; $p<0.018$). None of the other features of the brain lesions showed correlations with the FrSBe. Conclusion: Family ratings of three frontal behaviors are correlated with encephalomalacia in brain tumor patients. Our results suggest that tumor components have differential effects on frontal circuits. Systematic assessment of these behaviors in brain tumor patients may provide better understanding of these differential effects, and have implications for treatment.

C2 – Session5 1045-1100

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RTOG 0424: Preliminary results of a phase II study of a temozolomide (TMZ) and radiotherapy (RT) in high risk low grade gliomas (LGGs)

B. Fisher[1], C. Hu[2], D. Macdonald[1], G. Lesser[3], S. Coons[4], D. Brachman[5], S. Ryu[6], M. Werner-Wasik[7], J.P. Bahary[8], A. Chakravarti[9], M. Mehta[10]

[1]Western University, London, Ontario, [2]Radiation Therapy Oncology Group, Philadelphia, [3]Wake Forrest University, Winston-Salem, [4]Barrow Neurological Institute, Pheonix, [5]Arizona Oncology Services Foundation, Pheonix, [6]Henry Ford Hospital, Detroit, [7]Thomas Jefferson University Hospital, Philadelphia, [8]Centre Hospitalier de l'Universite de Montreal, Montreal,[9]The Ohio State University, The James, [10]University of Maryland Medical Systems, Baltimore

Purpose: To compare the 3-year (yr) survival (OS/PFS)of TMZ and RT in a high-risk LGG population to historical controls1 and to collect toxicity, neurocognitive(NCF) and quality of life(QOL)data. Methods: 129 LGG patients(pts)with >=3 risk factors(age>=40, astrocytoma, tumor across midline,tumor >=6 cm or preop neurofunction >1) received RT(54 Gy/30 fractions) with concurrent TMZ plus up to 12 cycles of post-RT TMZ. A battery of QOL /NCF tests were performed at baseline,6 and 12 mo. Results: 129 pts(75 males/54 females, median age 49,91% Zubrod score 0-1 with 69%, 25% and 6% with 3,4 and 5 risk factors) were evaluable. MST is not reached at a median follow-up of 4.1 yrs. 3 year OS of 73.1% was significantly improved from historical controls1. Grade 3 adverse events (AE) occurred in 43% of pts,grade 4 AE in 10%. One pt died of herpes encephalitis. 93 pts (72%)underwent QOL/NCF testing. Median FACT-BR/NCF scores remained stable or improved in the majority of pts at 12 mo. Conclusions: The 3 year OS rate of 73.1% for these high risk LGG pts is significantly higher than historical controls1 ($p<0.001$)with NCF/QOL scores remaining stable amongst those completing questionnaires.

C3 – Session5 1100-1115

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Volumetric tumor control and predictors of adverse events following gammaknife stereotactic radiosurgery for intracranial meningiomas

A Mansouri, S Larjani, G Klironomos, G Zadeh

Arthur and Sonia Labatt Brain Tumour Research Centre, The Hospital for Sick Children, Toronto, Ontario

Objective: To identify clinical, radiological, and dosimetric predictors of meningioma response to stereotactic radiosurgery (SRS), and post-SRS adverse radiation events (ARE). Methodology: A retrospective review of the database of meningioma patients treated with SRS between December 2005 and June 2013 at the University Health Network was performed. Seventy-five patients had at least 24 months of clinical and radiological follow-up, and were therefore included in this study. Tumor control was defined as any volumetric/diametric change less than +10%. Volumetric measurements were made using T1-Gadolinium enhanced 3T MRI scans with ITK-SNAP2.2 software. Univariate statistics were used to identify predictors of post SRS AREs. All statistical analyses were performed using IBM SPSS v20.0. Results: Females comprised 69.3% of patients, mean treatment age was 58.6 years, and median follow up was 36.2 months. Twenty-one patients had undergone prior surgical resection. One patient required salvage surgical intervention following SRS. Volumetric tumor control (52%) was inferior to diametric control (92%). Twenty-six patients (34.6%) experienced some form of new-onset complication after SRS: Headache (17.3%), cranial neuropathy (10.6%), speech impairment (2.7%), tremor (2.7%), and ataxia (1.3%). Fourteen patients (18.7%) experienced new onset T2 signal change signifying of edema; eight of these patients were symptomatic. Lower Conformity index (1.24 vs. 1.4), and higher treatment-

volume ratio (TVR) (0.80 vs. 0.72) were significantly associated with development of edema after SRS ($p<0.05$, power > 0.8). Conclusion: Volume-based reporting of SRS outcomes for meningiomas is more accurate for reporting tumor control. Conformity index and TVR were identified as predictors of edema following radiosurgery.

C4 – Session5 1115-1130

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Adjuvant radiosurgery to the tumor bed of resected metastases: A series of 130 patients

C Iorio-Morin[1], Y Ezahr[1], L Masson-Cote[2], J Blanchard[1], A Ebacher[2], D Mathieu[1]

[1]Department of Neurosurgery, Université de Sherbrooke, Sherbrooke, Quebec: Christian Iorio-Morin, Youssef Ezahr, Jocelyn Blanchard, David Mathieu; [2]Department of Radiation Oncology, Université de Sherbrooke, Sherbrooke, Quebec: Laurence Masson-Côté, Annie Ebacher

OBJECTIVE Optimal management following surgical removal of brain metastasis remains controversial. To assess the effectiveness and safety profile of tumor bed SRS following surgical resection of brain metastasis, we performed a retrospective analysis of 130 patients who received such treatment at our center. METHODS Patients treated at our center between 2004 and 2013 were included if they had one or more brain metastasis surgically removed, their tumor bed treated by SRS and at least 6 months of available follow-up. Average age at first SRS treatment was 59. At the time of SRS, gross total resection of the brain metastasis had been achieved in 80% of cases and systemic disease was inactive in 59% of patients. Tumor bed SRS was performed on average 3.7 weeks following surgery. Mean cavity volume was 12 cc with an average maximal and marginal dose of 36 Gy and 18 Gy respectively. RESULTS Results for the full cohort will be presented at the meeting. Preliminary analysis of 56 of the 130 patients reveals local control at the tumor bed was achieved in 86% of cases (average follow-up of 13 months). New brain metastases following SRS were identified in 63% of patients. Median survival was 8 months, with 67% of patients dying from a systemic rather than neurological cause. CONCLUSION SRS is a safe and effective adjuvant modality following surgical resection of brain metastasis. Pending completion of randomized control trials, our results support the use of SRS for local control of brain disease.

C5 – Session5 1130-1145

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Assessing Bimanual Performance in Brain Tumor Resection using a Novel Virtual Reality Simulator NeuroTouch

F Alotaibi[1,2], G Al Zhrani[1,2], H Azarnoush[1], A Winkler-Schwartz[1] M Mulla, RF Del Maestro[1]

[1]Neurosurgical Simulation Research Center, Montreal Neurological Hospital and Institute, McGill University, Montreal Quebec; [2]National Neuroscience Institute (NNI), Neurosurgery Department, King Fahad Medical City (KFMC)

Introduction: Validity assessment of NeuroTouch is important in the goal of using it in neurosurgical training, assessment and curriculum development. Methods: This study was conducted to assess bimanual performance of junior, senior resident and consultant resecting simulated brain tumors. Novel metrics were assessed including: total distance travelled by the tip of the ultrasonic aspirator and sucker (TPL), the maximum and sum of forces generated by instruments, blood loss, efficiency and coordination indexes and total brain tissue removed (BTR). Hypotheses: The complexity of tumor will influence neurosurgical performance and this influence will be greater in residents compare to consultants. Novel metrics will differentiate between groups. Results: All groups showed significant difference in 1) the amount of BTR comparing vague to clear boarder 2) simulated ultrasonic aspirator maximum and sum of forces on hard compare to soft tumors. Junior and senior residents showed more differences including 1) significantly more blood loss operating on hard versus soft tumors. 2) Higher ultrasonic aspirator TPL when operating on hard versus soft tumors. Junior resident also showed applied more sum of forces by the suction on the hard compare to the soft tumors.

Significant difference between the consultant, senior, and junior residents efficiency index observed (75.6%, 63.4%, 60.3% respectively P=0.001). Discussion: This study is the first to demonstrate significant differences in neurosurgical performance based on the complexity of tumor. Increasing tumor complexity influenced the junior resident group most was less of an influence on the senior and was least on the consultant group performance.

C6 – Session5 1145-1200

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Predictors of survival after second surgery for recurrent glioblastoma multiforme tumours

A Kilian, K Parvez, E. Monsalves, S Larjani, G Klironomos, G Zadeh

Arthur and Sonia Labatt Brain Tumour Research Centre, The Hospital for Sick Children, Toronto, Ontario

Background and Purpose: Glioblastoma multiforme (GBM) tumours are the most common brain tumours among adults. Although numerous treatment modalities exist, GBM has a mean recurrence period of less than seven months and a mean survival period of less than fifteen months. The impact of second surgery on recurrence remains unclear, with few definitive studies to date.