

P.097**Serum lactate as a potential biomarker of meningioma malignancy and preoperative treatment effect**

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Introduction: Serum lactate levels are useful indicators of illness severity such as sepsis. Previous investigations have shown that lactate is a potential biomarker for glioma malignancy; mechanism of which may be related to Warburg effect - accelerated lactate production when tumors uniquely undergo aerobic glycolysis. Our study reveals a correlation between serum lactate and meningioma WHO grade. We also observed a relationship between radiation effect on metastatic brain tumors and lactate levels. **Methods:** Data was collected from the charts of 14 patients with grade I meningiomas, 6 grade II meningiomas, and 9 metastatic brain tumors who underwent resection at our institution from 2013-2014. T test and ANCOVA were carried using R software controlling for base deficit. **Results:** The mean age was 53 years, with 75% females. There was a statistically significant change in intra- and post-operative lactate during meningioma resections, which had a strong positive correlation with grade ($p < 0.005$). Interestingly, the lactate rise was not significant for metastatic brain tumors ($p = 0.13$), but had a positive correlation with tumors that received pre-operative radiation ($p < 0.05$). **Conclusion:** Lactate is a potential non-invasive biomarker for brain tumor malignancy, as demonstrated in gliomas and meningiomas. Identifying metabolic biomarkers and their relationship to tumor pathology is important to understanding disease processes and improving patient care.

P.098**Perioperative predictive factors of intracranial meningioma recurrence following surgical resection**

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Background: Meningiomas represent the commonest benign intracranial tumor and surgical resection is the first line treatment. Tumor recurrence after surgical resection is common. The aim of this study is to identify peri-operative predictors of meningioma recurrence following surgical resection **Methods:** This was a retrospective hospital-based study of all surgical cases between January 1990 and June 2014. Information regarding age, gender, peri-operative imaging parameters such as peri-tumoral edema or post-operative hemorrhage or residual, and grade were collected. Linear and volumetric measurements (of both tumor volume and volume of edema) were collected as well. **Results:** Overall, 464 patients were reviewed; $n = 154$ (34%) percent of patients were male. The grade distribution was: 296 (74.6%) were Grade I, 78 (19.6%) Grade II, and 23 (5.8%) Grade III. Post-operative tumor bed hemorrhage, noted in 119 (29.9%) of cases, and preoperative peri-tumoral edema volume were significant predictors of tumor recurrence following resection ($P = 0.002$ and 0.037 , respectively). These parameters did not correlate with the MIB-1 index, tumour residual, grade of the tumour, or primary versus recurrent presentation. **Conclusions:** Pre-operative

peri-tumoral edema and post-operative tumor bed hemorrhage are independent predictive of tumor recurrence. Identification of other molecular and/or radiological predictive of recurrence factors could add in our understanding of meningioma behavior.

P.100**Predictors of survival after second surgery for recurrent glioblastoma tumours**

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Background: The impact of second surgery on recurrence remains unclear, with few definitive studies to date. This study sought to identify major predictors of survival after second surgery. **Methods:** A retrospective chart review was conducted for 21 patients who underwent elective surgery for GBM recurrence, at our institution, in the past 6 years. Kaplan Meier was applied to determine the significance of the variables on survival time. The Mann Whitney U test was used to determine whether the median survival time differed significantly between groups, for the factors of interest. **Results:** Among variables examined, age, less than ≥ 50 ($P = 0.04$) was significant. Patients younger than 50, had a median survival period of 11.8 months, while patients, age 50 or older, survived a median time of 4.2 months. Though chemotherapy after reoperation was not found to statistically significantly extend survival time on Kaplan-Meier ($P = 0.08$), the median survival time was found to be significantly higher in patients that received chemotherapy (10.6 months) after reoperation, compared with those who did not (3.9 months), using the Mann Whitney U test ($P = 0.05$). **Conclusions:** These results confirm that younger patients survive longer after second surgery and indicate that a second round of chemotherapy may prolong survival.

P.103**Predictors of the response of cystic brain metastases to gamma knife radiosurgery**

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Background: Gamma knife radiosurgery (GKR) is an effective treatment modality for local control of brain metastases. The predictors of response of cystic brain metastases (CBM) to GKR is not well understood. To measure progression and determine treatment prognostic factors, we quantified the percentage cystic and solid components of brain metastases before and after GKR treatment. **Methods:** 71 patients with CBM treated with GKR from 2006 to 2010 were selected from our institution's database. Volumetric analysis was performed on MRIs done on treatment date and the latest MRI. Clinical data and dosimetry parameters were reviewed to identify factors that predicted a response of cystic component and overall tumour control. **Results:** Metastatic lesions from the lung had significantly larger cystic components (by volume) prior to GKR than metastasis of colorectal origin ($p = 0.039$), and also had significantly larger cystic/total ratios than metastases from the breast ($p = 0.023$). Post-treatment, a trend of $>25\%$ improvement in both cystic and solid components of tumours was seen in lung primaries ($p = 0.239$). Metastatic brain

tumours of colorectal origin demonstrated the best treatment response of the cystic component. *Conclusion:* The primary cancer pathology of the CBM has an effect on the response to GKR, and can be used as a prognosticator of changes in cystic and solid volumes of lesions.

P.104

Latency period for radiological appearance of new intracranial metastases

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Introduction: This study sought to determine the overall and disease-specific latency period for radiological appearance of new intracranial metastases for patients with metastatic involvement of the brain. *Methods:* A retrospective chart review of patients with intracranial metastases between 2008–2010 was conducted. For each patient, the following were recorded: cancer type, gender, age at diagnosis of primary cancer and first intracranial metastases, treatments (chemotherapy, whole-brain-radiotherapy (WBRT), radiosurgery), and latency period for radiological appearance of new intracranial metastases. *Results:* 137 patients with multiple metastatic tumors were included in our study. Majority (>90%) of patients received chemotherapy and WBRT. The latency periods for appearance of new metastases for different cancer types were (in months): breast 12.7, lung 11.3, colorectal 9.0, melanoma 6.6, renal cell 8.1, other 8.1. The overall average latency period was 10.1 months. There was no relation between latency period for new metastases and the following: age at diagnosis of metastases ($p=0.174$), age at treatment ($p=0.199$), and cancer type ($p=0.124$). The latency period for new metastatic lesions differed significantly between males (8.1 months) and females (11.7 months) ($p=0.009$). *Conclusions:* The average latency period for new metastases is approximately 10 months. Our data suggests that males develop new metastatic tumors at a faster rate.

P.105

Intramedullary spinal cord metastasis from primary esophageal carcinoma

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Background: Intramedullary spinal cord metastasis (ISCM) are rare with primary lung, breast and melanoma accounting for up to 80% of cases. Diagnosis is often delayed or incorrect and these lesions can often be mistaken for primary astrocytoma or ependymoma given similar radiologic features. *Methods:* We present the case of an 80 year-old male with rapidly progressive quadriplegia and an enhancing intramedullary lesion at C4-7 with diffuse perilesional edema. The patient had previously undergone resection of non-metastatic esophageal carcinoma. *Results:* Bone scan revealed no evidence of skeletal or organ metastases. The patient underwent C5-7 laminectomy and resection of tumor with intra-operative monitoring. Final pathology revealed metastatic adenocarcinoma consistent with esophageal primary. PETCT revealed recurrent

esophageal disease and pleural-based metastatic deposits. The patient went on to receive palliative radiotherapy to the cervicothoracic spine. Neurologic status improved marginally. *Conclusions:* ISCM from primary esophageal carcinoma is extremely rare. We present to our knowledge one of three reports of such in the literature. Hematogenous dissemination via Batson's plexus and peri-vertebral plexuses is thought to be the likely route of spread. Treatment is primarily palliative, however surgical resection should be considered in the absence of metastatic disease.

P.106

Operative management of C3-C6 intramedullary gangliocytoma

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Background: Gangliocytoma is a WHO grade 1 tumour which is typically found in the brain. Incidence of this pathology occurring in the spinal cord is rare, accounting for 0.1%-0.4% of intramedullary spinal cord tumors. *Methods:* We present the case of a previously healthy 23-year-old male with bilateral weakness and accompanying sensory deficits progressing over several months. Magnetic resonance imaging (MRI) of the spine showed a C3-C6 enhancing, intramedullary mass. C3-6 laminoplasty and resection of the tumour was performed under neurophysiologic monitoring. Post-operatively the patient had no new neurologic deficits. *Results:* Final histopathology was consistent for gangliocytoma with extensive calcifications as confirmed by two separate neuropathologists. Gross total resection was not possible due to decreased motor evoked potentials detected by electrophysiologic monitoring. Post-operative MRI revealed a residual tumour measuring 58 x 15 x 25 mm with no further abnormal foci of enhancement. *Conclusions:* Gangliocytoma of the cervical cord is exceedingly rare, however its natural history is unclear. In our experience, maximal safe resection is warranted with the goal of preserving neurological status.

P.107

Primary supratentorial intracerebral malignant paraganglioma

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Paragangliomas are extra-adrenal neuroendocrine tumours that derive from neural crest. They are benign tumours in general but few cases had shown their tendency to metastasize. Malignant forms have been reported previously with intracranial metastasis from duodenal origin but primary intracranial origin represent a rare and unusual location for such tumours. We report a rare case for a 48 year old lady who presented with symptomatic right sided insular mass with negative metastatic work up. A complete surgical resection had been done with an unexpected diagnosis of primary gangliocytic paraganglioma with malignant features.