lipid intake group. **Conclusions:** In this cohort, higher energy intake is associated with increased brain maturation. Similarly, neonates with large WMI had higher full-scale IQ if they received greater lipid intake in the neonatal period, suggesting that greater early lipid intake may contribute to blunting the deleterious effects of WMI on neurodevelopmental outcomes.

Chair's Select Abstracts - Neurosurgery and Neuroimaging

C.1

Time Metrics and Clinical Outcomes of Thrombectomy in Acute Stroke Patients Before and After Implementation of COVID-19 Infection Protocols in Nine Canadian Stroke Centres

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Background: The coronavirus disease 2019 (COVID-19) pandemic has led an implementation of institutional infection control protocols. This study will determine the effects of these protocols on outcomes of acute ischemic stroke (AIS) patients treated with endovascular therapy (EVT). **Methods:** Uninterrupted time series analysis of the impact of COVID-19 safety protocols on AIS patients undergoing EVT. We analyze data from prospectively collected quality improvement databases at 9 centers from March 11, 2019 to March 10, 2021. The primary outcome is 90-day modified Rankin Score (mRS). The secondary outcomes are angiographic time metrics. **Results:** Preliminary analysis of one stroke center included 214 EVT patients (n=144 pre-pandemic). Baseline characteristics were comparable between the two periods. Time metrics "last seen normal to puncture" (305.7 vs 407.2 min; p=0.05) and "hospital arrival to puncture" (80.4 vs 121.2 min; p=0.04) were significantly longer during pandemic compared to pre-pandemic. We found no significant difference in 90-day mRS (2.0 vs 2.2; p=0.506) or successful EVT rate (89.6% vs 90%; p=0.93). **Conclusions:** Our results indicate an increase in key time metrics of EVT in AIS during the pandemic, likely related to infection control measures. Despite the delays, we found no difference in clinical outcomes between the two periods.

C.2

The use of magnetic resonance guided focused ultrasound for refractory psychiatric illness

B Davidson (Toronto)* *Y Meng* (Toronto) *P Giacobbe* (Toronto) *C Hamani* (Toronto), *N Lipsman* (Toronto)

Background: Obsessive compulsive disorder (OCD) and major depressive disorder (MDD) are common, often refractory, neuropsychiatric conditions for which new treatment approaches are urgently needed. Magnetic resonance guided focused ultrasound (MRgFUS) is a novel surgical technique permitting incisionless ablative neurosurgery. **Methods:** We examined the safety profile, clinical response, and imaging correlates of MRgFUS anterior capsulotomy (MRgFUS-AC) in patients with refractory OCD (n=7) and MDD (n = 10). **Results:** There were no serious adverse clinical or radiographic events. 5/7 OCD patients and 3/10 MDD patients met pre-established clinical response criteria. Neurocognitive performance improved on several measures of executive function (p<0.05). By 6 months, there were significant reductions in cerebral glucose metabolism, and reductions in the bilateral tracts connecting the thalamus with the orbitofrontal cortices, anterior cingulate cortex (p<0.05). Preoperative functional connectivity between the right ventral striatum and hippocampus was predictive of eventual clinical response (p-FDR<0.05). **Conclusions:** MRgFUS-AC is safe and demonstrates important evidence of efficacy in treatment resistant psychiatric disease, particularly OCD. The procedure was associated with structural and metabolic changes in brain networks implicated in affective regulation, Resting-state fMRI offers the ability to predict response, and potentially select patients most likely to improve.

C.3

Activated Gene Pathways in Post-Infectious Hydrocephalus (PIH): Proteogenomics and the PIH Expressome

AM Isaacs (Calgary)* *S Morton* (Boston) *M Movassagh* (Boston) *Q Zhang* (St. Louis) *C Hehnly* (Hershey) *L Zhang* (Hershey) *D Morales* (St. Louis) *RR Townsend* (St. Louis) *DD Limbrick* (St. Louis) *JN Paulson* (San Francisco) *SJ Schiff* (College Park) *Control of Neonatal Sepsis and Hydrocephalus in Africa (CONSHA) Group* ()

Background: Proteogenomics, the integration of proteomics and RNASeq expands the discovery landscape for candidate expressed gene networks to obtain novel insights into host response in post-infectious hydrocephalus (PIH). We examined the cerebrospinal fluid (CSF) of infants with PIH, and case controlled against age-matched infants with non-postinfectious hydrocephalus (NPIH) to probe the molecular mechanisms of PIH, leveraging molecular identification of bacterial and viral pathogens. **Methods:** Ventricular CSF samples of 100 infants ≤ 3 months of age with PIH (n=64) and NPIH (n=36) were analyzed with proteomics and RNASeq. 16S rRNA/DNA sequencing and virome capture identified *Paenibacillus spp.* and cytomegalovirus as dominant pathogenetic bacteria implicated in our PIH cohort. Proteogenomics assessed differential expression, gene set enrichment and activated gene pathways. **Results:** Of 616 proteins and 11,114 genes, there was enrichment for the immune system, cell-cell junction signaling and response to oxidative stress. Proteogenomics yielded 33 functionally and genetically associated gene sets related to neutrophil activation, platelet activation, and cytokines (interleukins and interferon) signaling. **Conclusions:** We identified PIH patients with severe disease at time of hydrocephalus surgery, to have differential expression of proteins/genes involved in neuroinflammation, ependymal barrier

integrity and reaction to oxidative stress. Further studies are needed to examine those proteins/genes as biomarkers for PIH.

C.4

Epigenetic drivers of malignant transformation in diffuse gliomas

MR Voisin (Toronto)* *V Patil* (Toronto) *F Nassiri* (Toronto), *G Zadeh* (Toronto)

Background: Despite treatment, gliomas often exhibit disease progression, leading to recurrent glioblastoma (GBM) or malignant transformation of low-grade gliomas (LGG) associated with treatment resistance and poor prognosis. To date, the molecular factors driving glioma recurrence are poorly understood. **Methods:** We analyzed a cohort of 324 glioma samples from our institution including a unique cohort of 81 patients with matched primary and recurrent tumour pairs. We performed a paired, integrated multi-platform analysis consisting of DNA methylation profiling on all 324 samples, gene expression on 87 samples, and matched plasma cell-free DNA methylome analysis on 82 samples. **Results:** LGG that undergo malignant transformation are associated with DNA hypomethylation at recurrence, including decreased tumour purity and increased copy number variation. Integrated pathway analyses identified *IL-6*, associated with multiple pro-oncogenic pathways, and *CCR2*, associated with the recruitment of tumour-associated macrophages, as top genes involved in malignant transformation. Matched plasma methylation demonstrated a shift in the methylation signature at recurrence that can prove valuable as a non-invasive biomarker for early detection of malignant progression. **Conclusions:** We provide the first detailed description of the epigenetic evolution of gliomas and identify epigenetic drivers of malignant transformation including non-invasive biomarkers for early detection of malignant progression.

C.5

Musashi-1 is a master regulator of aberrant translation in MYC-amplified Group 3 medulloblastoma

MM Kameda-Smith (Hamilton)* *H Zhu* (Toronto) *E Luo* (San Diego) *C Venugopal* (Hamilton) *K Brown* (Toronto) *BA Yee* (San Diego) *S Xing* (Hamilton) *F Tan* (San Diego) *D Bakhshinyan* (Hamilton) *AA Adile* (Hamilton) *M Subapanditha* (Hamilton) *D Picard* (Dusseldorf) *J Moffat* (Toronto) *A Fleming* (Hamilton) *K Hope* (Hamilton) *J Provias* (Hamilton) *M Remke* (Dusseldorf) *Y Lu* (Hamilton) *J Reimand* (Toronto) *R Wechsler-Reya* (La Jolla) *G Yeo* (San Diego), *SK Singh* (Hamilton)

Background: Medulloblastoma (MB) is the most common solid malignant pediatric brain neoplasm. Group 3 (G3) MB, particularly MYC amplified G3 MB, is the most aggressive subgroup with the highest frequency of children presenting with metastatic disease, and is associated with a poor prognosis. To further our understanding of the role of MSI1 in MYC amplified G3 MB, we performed an unbiased integrative analysis of eCLIP binding sites, with changes observed at the transcriptome, the translatome, and the proteome after sh*MSI1* inhibition. **Methods:** Primary human pediatric MBs, SU_MB002 and HD-MB03 were kind gifts from Dr. Yoon-Jae Cho (Harvard, MS) and Dr. Till Milde (Heidelberg) and cultured for in vitro and in vivo experiments. eCLIP, RNA-seq, Polysome-seq, and TMT-MS were completed as previously described. **Results:** *MSI1* is overexpressed in G3 MB. shRNA Msi1 interference resulted in a reduction in tumour burden conferring a survival advantage to mice injected with sh*MSI1* G3MB cells. Robust ranked multiomic analysis (RRA) identified an unconventional gene set directly perturbed by MSI1 in G3 MB. **Conclusions:** Our robust unbiased integrative analysis revealed a distinct role for MSI1 in the maintenance of the stem cell state in G3 MB through post-transcriptional modification of multiple pathways including identification of unconventional targets such as HIPK1.

C.6

Action-Related Fixation in Microsuturing, a New Gaze Behavior Metric to Differentiate the Level of Expertise

J Chainey (Edmonton)* *B Zheng* (Edmonton) *M Kim* (Edmonton) *A Elomaa* (Kuopio) *R Bednarik* (Kuopio), *C O'Kelly* (Edmonton)

Background: Gaze behavior differences between expert and novice surgeons have been established in previous studies mainly from the general surgery field.Limited information is available about surgeon's visual attention during microsurgery procedures where surgical microscope is used. **Methods:** 4 experts and 3 novices performed 37 independent sutures under the surgical microscope.Eye movements of surgeons and scene video of the surgical performance were recorded.Total suturing time and subtask times were compared between level of expertise.We defined three discrete surgical actions and examined eye gaze (fixation) directly related to each of these actions.Fixation duration (measured by total,pre-action,and post-action duration) were compared between expert and novice, over 3 subtasks (piercing, exiting and cutting) and between pre- and post-action phases. **Results:** Expert surgeons completed the suture with shorter total time than novices.On average,expert displayed longer fixation time than novice.Experts also maintained their visual engagement constantly over the 3 level of subtask in comparison to novices who required a longer fixation time for the challenging subtask (piercing).Experts use longer pre- than post-action fixation, and this pattern is distributed over all three subtasks.This gaze engagement strategy was not shown in novices. **Conclusions:** The action-related fixation can be used to evaluate microsurgeons' level of expertise and in surgical education for gaze training.