Volume 34 Number 2 (**Supplement 2**) May 2007

42nd Annual Congress

Canadian Neurological Sciences Federation

EDMONTON, ALBERTA JUNE 19-22, 2007

ABSTRACTS
AND PROGRAM

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The CNSF and CJNS would like to thank the 2006 – 2007 CNSF Board of Directors, the CJNS Board of Directors and Committee Chairs for all their hard work and contributions over the year. Without the invaluable effort these dedicated volunteers provide, the two organizations could not continue to run so successfully and smoothly.

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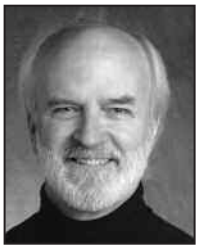

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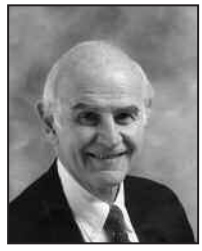

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CANADIAN NEUROLOGICAL SCIENCES FEDERATION
FÉDÉRATION DES SCIENCES NEUROLOGIQUES DU CANADA

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ABSTRACTS

SOCIETY PRIZE PRESENTATIONS

Canadian Association of Child Neurology – President's Prize
Canadian Neurological Society – Frances McNaughton Memorial Prize
Canadian Neurological Society – Andre Barbeau Prize
Canadian Society of Clinical Neurophysiologists – Herbert Jasper Prize

PLATFORM PRESENTATIONS

Thursday, June 21, 2007

Friday, June 22, 2007

POSTER PRESENTATIONS

Thursday, June 21, 2007 to Friday, June 22, 2007

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2007 Society Prize Papers

The President's Prize – Canadian Association of Child Neurology

Novel corticospinal tract pre-wallerian degeneration in pediatric stroke: acute MRI prediction of outcome and TMS correlates of reorganization.

A Kirton (Toronto), T Domi (Toronto), R Chen (Toronto), M Shroff (Toronto), C Gunraj (Toronto), E Kouzmatcheva (Toronto), G deVeber (Toronto)*

Background: Diffusion MRI (DWI) demonstrates pre-wallerian degeneration in descending corticospinal tracts (DCST) in neonatal arterial ischemic stroke (AIS) and predicts poor outcome. This signal is unstudied in older children and implications for reorganization are unknown. *Methods:* A consecutive AIS cohort (1mo-18yrs) with acute DWI and >12months follow-up were enrolled (Sick Kids Children's Stroke Program). A validated software technique quantified DCST DWI variables and correlations to the Pediatric Stroke Outcome Measure (PSOM) were sought. Reorganizational patterns were evaluated using transcranial magnetic stimulation (TMS). *Results:* DCST DWI signal was detected in 20/29 children (69%), with 85% suffering poor motor outcome. DCST variables correlated with hemiparesis included: (1)Any DCST, (2) any midbrain, (3)% peduncle (4) vertical length, and (6) relative volume affected (all $p<0.003$). DCST signal increased over time, outlasted infarct changes, and was difficult to appreciate on visual inspection. Unexpectedly, DWI signal was detected in the contralesional DCST in 7 children, all with severe hemiparesis. Using TMS, no pathological ipsilateral CST projections were detected in 4 of these 7 children. *Conclusions:* DCST DWI signal is an acute predictor of motor outcome in childhood stroke and can help guide management. Previously unrecognized contralesional DCST signal predicts a severe outcome and does not appear to represent maladaptive recruitment of ipsilateral DCST projections.

Frances McNaughton Memorial Prize – Canadian Neurological Society

Dominantly inherited essential cortical myoclonus in a large Canadian Mennonite family

JL Steckley (London), G Gibson (Vancouver), A Kirk (Saskatoon), AF Hahn (London)*

Background: Myoclonus, multifocal shock-like involuntary movements, may be of cortical, subcortical or spinal origin and is acquired or hereditary. Familial subcortical myoclonus and dystonia, classically relieved by alcohol, is caused by epsilon-sarcoglycan mutations. Hereditary cortical myoclonus, tremor and epilepsy has been mapped to several loci, without known gene mutations. Familial cortical myoclonus without epilepsy has not been well described. The goal of this study was to characterize the inherited myoclonic syndrome in a large kindred and to identify the causative gene mutation. *Methods:* Using a standardized questionnaire, 31 family members were interviewed and given a complete neurological examination. 22/31 were assessed by SSEPs for high amplitude cortical potentials. DNA was isolated for genetic studies. *Results:* 11/31 family members gave a classical history of multifocal myoclonus evoked solely by somatosensory stimuli. This was of early onset, progressive and disabling. There was no history of seizures. 10/10 affected individuals demonstrated giant cortical potentials with SSEP studies, characteristic of cortical myoclonus. EEGs were normal. Genetic linkage analysis is underway. The proband did not show mutations in the epsilon-sarcoglycan gene. *Conclusions:* Isolated cortical myoclonus of autosomal dominant inheritance was documented in a large four-generation Mennonite family. The condition is clinically and genetically distinct from myoclonus-dystonia/essential myoclonus. It also differs clinically from the hereditary myoclonic epilepsy syndromes. This well-characterized family provides a unique opportunity to identify a genetic cause for essential cortical myoclonus.

Andre Barbeau Memorial Prize - Canadian Neurological Society

The role of microglia in ALS

L Korngut (London), L Ang (London), M Strong (London)*

Microglia appear to play a significant role in the pathophysiology of amyotrophic lateral sclerosis (ALS) but whether they are primarily neuroprotective or toxic is unclear. We present a morphological description of microglia within the human spinal cord, in ALS patients, with comparison of clinically moderately (lumbar) and severely affected (cervical) regions.

Tissue blocks from four respiratory-onset ALS patients were retrieved and multiple 4 micron slices from cervical and lumbar regions were performed. Standard tissue stains were performed including HLA-DR3 immunostaining to identify microglia. Slides were reviewed to identify areas with surviving motor neurons. A standard circular 500 micron marker was placed around each neuron photomicrograph. HLA-DR3 staining cells, representing microglia, were counted and categorized in three grades; grade one: activated; grade two: primed/ramified; grade 3: highly activated/amoeboid.

A higher number of total activated microglia were present surrounding motor neurons within the cervical segment as compared to the lumbar in the anterior horns of ALS patients with respiratory-onset ALS. This finding was highly statistically significant ($p=0.0034$). No increase in the degree of microglial activation was observed. Differential involvement of microglia in clinically severely versus moderately affected human tissue was demonstrated. The significance of this finding and its relationship to the pathophysiology of ALS requires further investigation.

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2007 Society Prize Papers

Herbert Jasper Prize – Canadian Society of Clinical Neurophysiologists

Failure of corticosteroid iontophoresis to treat carpal tunnel syndrome: a double-blind randomized controlled trial

N Amirjani (Winnipeg), SG Rennie (Edmonton), NL Ashworth (Edmonton), J Watt (Edmonton), T Gordon (Edmonton), K Chan (Edmonton)*

Background: Injection of corticosteroids into the carpal tunnel alleviates the symptoms of patients with mild to moderately severe carpal tunnel syndrome (CTS). However, this procedure is not popular due to the risks attributed to injection into a limited space at the wrist. This study was designed to investigate the effectiveness of dexamethasone iontophoresis, a non-invasive method, in treating CTS. *Methods:* In a double-blind randomized controlled trial, the response to six sessions of treatment with 0.4% dexamethasone sodium sulfate was compared with distilled water over six months. Outcome of treatments were assessed by using nerve conduction studies, Levine's Self-Assessment Questionnaire, the Purdue Pegboard Test, and the Semmes Weinstein Monofilaments. *Results:* Most of the outcome measures did not show any significant change following treatment. Although there was subjective improvement of symptom severity scores in the treatment group quantified by the Levine's Self-Assessment Questionnaire, similar improvement was also detected in the control group ($p<0.05$). *Conclusion:* Although corticosteroid iontophoresis is feasible in clinical settings and is well tolerated by patients, iontophoresis of 0.4% dexamethasone was not effective in the treatment of mild to moderate CTS.

K.G. McKenzie Prize in Clinical Neuroscience Research - Canadian Neuosurgical Society

The impact of therapeutic modality on outcomes following repair of ruptured intracranial aneurysms: An administrative data analysis.

CJ O'Kelly (Toronto), A Kulkarni (Toronto), P Austin (Toronto), D Urbach (Toronto), M Wallace (Toronto)*

Background: Enrolling a selected sample of ruptured intracranial aneurysm patients, the International Trial of Aneurysm Treatment (ISAT) found endovascular coiling to be superior to microsurgical clipping. The performance of coiling in a more general population has not been adequately studied. *Methods:* Using Ontario provincial administrative data, we conducted a retrospective cohort study of adult subarachnoid hemorrhage patients undergoing endovascular versus surgical aneurysm repair. The primary outcome was time to death or readmission for subarachnoid hemorrhage, analyzed using a multivariable Cox proportional hazards model. Propensity scores were used to compare a matched subgroup of aneurysms patients, simulating the conditions of a randomized trial. *Results:* Between 1995 and 2004, 2342 ruptured aneurysms were clipped and 778 were coiled. In analysis of the primary outcome, endovascular coiling was associated with a significantly increased hazard of death or SAH readmission (HR 1.25, $p<0.05$). Similar results were obtained from the propensity score matched analysis (HR 1.23, $p<0.05$). *Conclusions:* The results of the current analysis question the generalization of the ISAT trial results to all ruptured aneurysm patients. Given the limitations inherent to this form of analysis, further clinical studies, rigorously assessing the performance of endovascular therapy in non-ISAT aneurysm patients, are indicated.

K.G. McKenzie Prize in Basic Neuroscience Research - Canadian Neuosurgical Society

Enhancement of sensorimotor behavioural recovery in parkinsonian rats with a multitarget basal ganglia dopaminergic and GABAergic transplantation strategy

K Mukhida (Halifax), M Hong (Halifax), M McLeod (Halifax), G Miles (Halifax), N Kobayashi (Halifax), B Baghbaderani (Calgary), A Sen (Calgary), L Behie (Calgary), R Brownstone (Halifax), I Mendez (Halifax)*

Introduction: One current transplantation strategy for Parkinson's disease (PD) places fetal dopaminergic cells in the striatum (ST); however, this does not lead to complete functional recovery. An additional approach would be to transplant GABAergic cells to inhibit the subthalamic nucleus (STN) and substantia nigra (SN). This was explored using cells derived from either fetal rats or bioreactor-expanded human neural precursor cells (HNPCs). *Methods:* GABAergic cells (fetal rat or predifferentiated HNPCs) were transplanted into the STN and/or SN in conjunction with dopaminergic grafts of the ST in parkinsonian rats. Control animals received dopaminergic grafts alone or in conjunction with undifferentiated HNPCs in the SN and/or STN. Post-transplantation, graft function and viability were assessed electrophysiologically and immunohistochemically. *Results:* By 9 weeks post-transplantation, animals that received either fetal or HNPC GABAergic transplants showed significant improvement in akinesia and forelimb motor function compared to controls. Predifferentiated HNPCs maintained a GABAergic phenotype in vivo. Transplantation of fetal cells additionally resulted in improved electrophysiological outcomes. *Conclusions:* Restoration of dopaminergic activity to the ST in concert with inhibition of the STN and SN by GABAergic grafts enhances sensorimotor behavioural recovery in parkinsonian rats. This new approach may be beneficial in improving clinical outcomes in patients with PD.

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PLATFORM PRESENTATIONS

CHAIR'S SELECT PLENARY PRESENTATIONS

A-01

Prospective error recording in surgery: an analysis of 1108 elective neurosurgical cases

SS Stone (Toronto), M Bernstein (Toronto)*

Background: Surgical errors are common and can lead to significant morbidity and mortality, necessitating detailed prospective analysis that emphasizes prevention. *Methods:* One neurosurgeon prospectively recorded errors and complications for consecutive patients undergoing elective neurosurgical procedures; scoring each error for type, severity, preventability and consequence. *Results:* 1108 cases were studied between May 2000 and August 2006; comprising 76.1% cranial, 22.7% spinal, and 1.2% other procedures. 87.1% of cases accounted for 2684 errors. Most errors were technical (27.8%), contamination (25.3%), or equipment (18.2%) related. 22.6% of errors were considered major and 77.4% minor. 45.7% of errors clinically impacted the patient. 16.7% of complications were related to errors. 78.5% of errors and 74.2% of error-related complications were deemed preventable. A propensity for error was identified with cranial procedures and higher American Society of Anesthesiologists scores ($P < 0.01$). No pattern of fluctuation in error frequency per month was observed. *Conclusions:* Neurosurgical errors are common, often preventable, and frequently impact patients. Procedure and patient characteristics are important considerations when addressing error. To maintain quality control, contribute to the safety of health care, and foster open discussion of error, surgeons must track and analyse errors so that methods of prevention may be developed.

A-02

Epilepsy surgery in children under 3 years of age: A Canadian wide survey

P Steinbok (Vancouver), YC Gan (Vancouver), MB Connolly (Vancouver), L Carmant (Montreal), B Sinclair (Edmonton), J Rutka (Toronto), R Griebel (Saskatoon), K Aronyk (Edmonton), W Hader (Calgary), E Ventureyra (Ottawa)*

Objective: To determine clinical characteristics, surgical challenges and outcome in children undergoing epilepsy surgery under 3 years of age. *Methods:* Retrospective data on patients who underwent epilepsy surgery under age 3 years at multiple centers across Canada from January 1987 to September 2005 were collected and analysed. *Results:* There were 81 patients from 7 centers. Mean age at seizure onset was 149 days (1-365 days). Mean age at surgery was 15.6 months (1 - 36 months). Etiologies were malformations of cortical development (39), Sturge-Weber (17), tumour (11) and other (14). Surgeries comprised 27 cortical resections, 21 lesionectomies, 26 hemispheric operations, 3 callosotomies, 1 temporal lobectomy and 3 other procedures. There was no surgical mortality. Transfusion rate intraoperatively was 43% and postoperatively 9.9%. Complications included infection (5), CSF leaks (2), aseptic meningitis (3), hydrocephalus (1), SIADH (2), subdural hematoma (1) and infarction (3). Of 70 patients with seizure outcome assessed at > 1year, 53 (75.7%) were seizure free, 4 had occasional seizures and 13 had frequent seizures but with reduced frequency. *Conclusion:* Epilepsy surgery under 3 years is relatively safe and is effective in controlling seizures. Young age is not a contra-indication to epilepsy surgery.

A-03 *K.G. McKenzie Memorial Prize Winner*
Clinical Neurosciences

The impact of therapeutic modality on outcomes following repair of ruptured intracranial aneurysms: An administrative data analysis.

CJ O'Kelly (Toronto), A Kulkarni (Toronto), P Austin (Toronto), D Urbach (Toronto), M Wallace (Toronto)*

Background: Enrolling a selected sample of ruptured intracranial aneurysm patients, the International Trial of Aneurysm Treatment (ISAT) found endovascular coiling to be superior to microsurgical clipping. The performance of coiling in a more general population has not been adequately studied. *Methods:* Using Ontario provincial administrative data, we conducted a retrospective cohort study of adult subarachnoid hemorrhage patients undergoing endovascular versus surgical aneurysm repair. The primary outcome was time to death or readmission for subarachnoid hemorrhage, analyzed using a multivariable Cox proportional hazards model. Propensity scores were used to compare a matched subgroup of aneurysms patients, simulating the conditions of a randomized trial. *Results:* Between 1995 and 2004, 2342 ruptured aneurysms were clipped and 778 were coiled. In analysis of the primary outcome, endovascular coiling was associated with a significantly increased hazard of death or SAH readmission (HR 1.25, $p<0.05$). Similar results were obtained from the propensity score matched analysis (HR 1.23, $p<0.05$). *Conclusions:* The results of the current analysis question the generalization of the ISAT trial results to all ruptured aneurysm patients. Given the limitations inherent to this form of analysis, further clinical studies, rigorously assessing the performance of endovascular therapy in non-ISAT aneurysm patients, are indicated.

A-04

STN-DBS for Parkinson's disease: variation in outcomes and adverse effects

P Itthimethin (Calgary), K Doig-Beyaert (Calgary), K Hunka (Calgary), O Suchowersky (Calgary), S Kraft (Calgary), Y Starreveld (Calgary), M Kwan (Calgary), ZH Kiss (Calgary)*

Background: Bilateral subthalamic nucleus (STN) deep brain stimulation (DBS) has become a common therapeutic option in selected patients with advanced Parkinson's disease. Our aim was to measure outcomes and adverse events in our patient group, and to correlate these with post-operative imaging and microelectrode

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recording. *Methods:* A prospective quality assurance study was conducted in 30 consecutive patients treated with bilateral STN-DBS. Patients were evaluated at baseline, 6 and 12 months after surgery using the Unified Parkinson's Disease Rating Scale (UPDRS), ON and OFF medications and stimulation. Results of post-op imaging and microelectrode recordings were compared in patients with best outcomes, and those with adverse effects. *Results:* Compared to baseline, the UPDRS part II (reflecting activities of daily living) and part III (motor scores) OFF medication and ON stimulation decreased from 19.6 ± 7.1 to 14.1 ± 6.6 ($p=0.006$) and from 38.8 ± 13.6 to 23.8 ± 12.4 ($p<0.001$), respectively, at 1 year post-op. Medications were reduced from 1380 ± 645 to 702 ± 526 mg/day ($p<0.001$). Surgical complications included 4 hemorrhages (3 of which ≈ 1 cm, 2 patients never implanted) and 1 infection. Other adverse effects included speech disturbance (3), weight gain (1), mood (4) and personality (2) changes. One patient committed suicide >2 y post-op. Significant cognitive decline occurred in 2 patients with borderline neuropsychology assessments pre-op, 1 of whom had a hemorrhage. There was no obvious correlation between adverse effects, electrode placement on MRI or microelectrode recordings. *Conclusions:* Patients with advanced Parkinson's disease experience significant improvements in motor function with bilateral STN-DBS, moderate improvements in activities of daily living, and can reduce their medications by almost 50%. Stimulation can also produce adverse effects on speech, personality and mood; these are not predictable based on MR imaging or intra-operative microelectrode recording.

A-05 *Francis McNaughton Memorial Prize Winner - CNS*

Dominantly inherited essential cortical myoclonus in a large Canadian Mennonite family

JL Steckley (London), G Gibson (Vancouver), A Kirk (Saskatoon), AF Hahn (London)*

Background: Myoclonus, multifocal shock-like involuntary movements, may be of cortical, subcortical or spinal origin and is acquired or hereditary. Familial subcortical myoclonus and dystonia, classically relieved by alcohol, is caused by epsilon-sarcoglycan mutations. Hereditary cortical myoclonus, tremor and epilepsy has been mapped to several loci, without known gene mutations. Familial cortical myoclonus without epilepsy has not been well described. The goal of this study was to characterize the inherited myoclonic syndrome in a large kindred and to identify the causative gene mutation. *Methods:* Using a standardized questionnaire, 31 family members were interviewed and given a complete neurological examination. 22/31 were assessed by SSEPs for high amplitude cortical potentials. DNA was isolated for genetic studies. *Results:* 11/31 family members gave a classical history of multifocal myoclonus evoked solely by somatosensory stimuli. This was of early onset, progressive and disabling. There was no history of seizures. 10/10 affected individuals demonstrated giant cortical potentials with SSEP studies, characteristic of cortical myoclonus. EEGs were normal. Genetic linkage analysis is underway. The proband did not show mutations in the epsilon-sarcoglycan gene. *Conclusions:* Isolated cortical myoclonus of autosomal dominant inheritance was documented in a large four-generation Mennonite family. The condition is clinically and genetically distinct from myoclonus-dystonia/essential myoclonus. It also differs clinically from the hereditary myoclonic epilepsy syndromes. This well-characterized family provides a unique opportunity to identify a genetic cause for essential cortical myoclonus.

A-06 *Herbert Jasper Prize Winner - CSCN*

Failure of corticosteroid iontophoresis to treat carpal tunnel syndrome: a double-blind randomized controlled trial

N Amirjani (Winnipeg), SG Rennie (Edmonton), NL Ashworth (Edmonton), J Watt (Edmonton), T Gordon (Edmonton), K Chan (Edmonton)*

Background: Injection of corticosteroids into the carpal tunnel alleviates the symptoms of patients with mild to moderately severe carpal tunnel syndrome (CTS). However, this procedure is not popular due to the risks attributed to injection into a limited space at the wrist. This study was designed to investigate the effectiveness of dexamethasone iontophoresis, a non-invasive method, in treating CTS. *Methods:* In a double-blind randomized controlled trial, the response to six sessions of treatment with 0.4% dexamethasone sodium sulfate was compared with distilled water over six months. Outcome of treatments were assessed by using nerve conduction studies, Levine's Self-Assessment Questionnaire, the Purdue Pegboard Test, and the Semmes Weinstein Monofilaments. *Results:* Most of the outcome measures did not show any significant change following treatment. Although there was subjective improvement of symptom severity scores in the treatment group quantified by the Levine's Self-Assessment Questionnaire, similar improvement was also detected in the control group ($p<0.05$). *Conclusion:* Although corticosteroid iontophoresis is feasible in clinical settings and is well tolerated by patients, iontophoresis of 0.4% dexamethasone was not effective in the treatment of mild to moderate CTS.

A-08

The learning curve of minimally-invasive lumbar microdiscectomy using a tubular retractor system

D Fourney (Saskatoon), G McLoughlin* (Saskatoon)*

Background: An appreciation of the learning curve of a new surgical technique is important for its safe integration into clinical practice. The objective of this study was to assess the learning curve for minimally-invasive lumbar microdiscectomy (MIM) utilizing the METRx tubular retractor system. *Methods:* A prospective evaluation of a single surgeon's first 26 consecutive cases of MIM for radiculopathy secondary to single-level posterolateral lumbar disc herniation was performed. The learning curve was assessed using surgery time, rate of conversion to open procedure, and complication rate. Results were compared with a consecutive group of 26 patients with the same surgical indications who underwent standard lumbar microdiscectomy by the same surgeon. *Results:* The duration of surgical operating time decreased over the course of the study. With experience, operating time for MIM became slightly shorter than open discectomy. There was only 1 conversion to open discectomy (Case 2). The asymptote of the learning curve was about 15 cases. *Conclusions:* The learning curve for MIM was demonstrated. Further assessment of this curve for a large group of surgeons is necessary before a randomized controlled clinical comparison of standard microdiscectomy versus MIM can be conducted.

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General Neurosurgery I

B-01

Intraoperative monitoring of cochlear nerve function

DW Rowed (Toronto), DA Houlden (Toronto)*

Background: Intraoperative injury to the cochlear nerve and/or cochlea is usually of uncertain etiology. Intraoperative ECochG and BAEP change predicts likelihood of hearing loss and may elucidate pathophysiology. *Methods:* 164 vestibular schwannoma resections, 33 vestibular nerve sections, 22 nervus intermedius sections and 7 trigeminal microvascular decompressions or sections were monitored. Bilateral BAEPs were recorded from needle electrodes in the EAC - Cz, and ECochG by the transtympanic promontory recording technique. Stimulation was with unfiltered rarefaction clicks through ear inserts. Recording was continuous from immediately following anesthetic induction until closure. Postoperative audiometry was evaluated by the Gardner & Robertson classification. *Results:* ECochG (CAP N1) threshold shift at closure predicted probability of postoperative serviceable hearing (Gardner Robertson Class 1&2) with a high degree of accuracy ($P < 0.0001$, odds ratio 0.947, CI .925-969). Shift of > 20dB was highly predictive of loss of serviceable hearing ($p<0.001$). BAEP peak V loss at closure uniformly predicted postoperative anacusis in all but one case. In that case, all peaks except I (ipsilateral stimulation) were lost for 45 minutes (until closure). Nevertheless, postoperative BAEP was normal bilaterally and ipsilateral hearing was Gardner Robertson Class1. *Conclusions:* Postoperative serviceable hearing can be predicted with high accuracy by presence of BAEP peak V and ECochG CAP N1 threshold shift<20dB at the end of the procedure. A new finding is a prolonged intraoperative loss of BAEP peak V with postoperative recovery of all peaks accompanied by serviceable hearing. This suggests that the underlying pathophysiology may be ischemic.

B-02

ETV (Endoscopic third ventriculostomy) does ventricular size correlate with clinical outcome?

G Lapointe (Québec), M Lapointe (Québec), A Turmel (Québec)*

Objective: To see if there is a correlation between ventricular size and clinical outcome of patients who underwent an endoscopic third ventriculostomy (ETV) in a closed-skull population. *Methods:* Clinical and radiological data of patients who underwent ETV between 1998 and September 2006 were reviewed and the frontal and occipital horn ratio was measured pre-operatively, early post-op, post-op 3 months and late post-op by 3 independent observers. Patients were divided in 2 groups (success and failure) and statistical analyses were made for both groups. *Results:* The charts of 52 patients were reviewed. Ventricular size decreased by 4.11 % (±7.42) early post-op, 13.03% (±11.81) at 3 months and 12.18% (±11.12) late post-op in the success group. In the failure group, we observed a decrease of 3.35% (±6.37) early post-op and 1.98% (±14.94) but an increase of 4.30% (±13.86) late post-op. Reduction of ventricular size was statistically significant ($p \leq 0.05$) both at 3 months and late post-op between the success and failure groups. *Conclusion:* A reduction of ventricular size is observed when an ETV is successful. When ventricular size does not decrease or is increasing post-operatively, one should consider a failure of ETV. Late follow-up of patients who underwent an ETV is mandatory.

B-03

A prospective study of awake craniotomy used routinely and non-selectively for supratentorial tumors

D Serletis (Toronto), M Bernstein (Toronto)*

Background: Awake craniotomy has been increasingly used in the non-selective surgical resection of virtually all supratentorial brain tumors and provides an alternative to surgery under general anesthesia. *Methods:* The demographic features, presenting symptoms, tumor location, histological diagnosis, outcomes and complications were prospectively documented for 610 patients undergoing awake craniotomy for supratentorial tumor resection. *Results:* Intra-operative brain mapping was employed in 511 cases (83.8%). Mapping identified eloquent cortex (i.e. positive mapping) in 115 patients (22.5%), and was negative in 396 patients (77.5%). Neurological deficits occurred in 89 patients (14.6%). In the subset of 511 mapped patients, 78 (15.3%) experienced post-operative neurological worsening. This was more common in patients with pre-operative neurological deficits or in those exhibiting positive mapping. Twenty-five patients (4.9%) experienced intra-operative seizures; two patients with generalized seizures required conversion to general anesthesia.

Four patients (0.7%) developed wound complications. Seven patients (1.1%) developed post-operative hematomas, four of whom urgently required a repeat craniotomy. Two patients (0.3%) required readmission to hospital. There were 3 deaths (0.5%). *Conclusions:* Awake craniotomy is safe, practical and effective for resection of supratentorial lesions of diverse pathology and locations. It allows for intra-operative brain mapping and avoids the complications inherent to general anesthesia.

B-04

Visual fields are preserved in acromegalic patients treated with SRT

IG Fleetwood (Halifax), DB Clarke (Halifax), L Clarke (Halifax), S Imran (Halifax), E Ur (Halifax), DE Rheaume (Halifax), LA Mulroy (Halifax)*

Acromegalic patients who are failed by surgical and medical therapy can be treated with conformal radiation delivered as a single large dose (stereotactic radiosurgery; SRS), or in fractionated doses (stereotactic radiotherapy; SRT). The visual pathways (optic nerve, chiasm and tracts) are radiation sensitive so patients with lesions close to visual pathways may not be SRS candidates.

Twelve acromegalic patients were treated with LINAC SRT between May 2003 and July 2006. Eleven were treated with a peripheral dose of 5000 cGy (80% isodose) in 25 fractions using the BrainLab micro-multileaf collimator. Seven tumours were within 5mm of the visual pathways. All but one are followed in a multidisciplinary clinic with regular pituitary biochemistry, MRI and Goldmann visual fields (GVF).

Four patients had transient visual changes on early GVF (<6 months), but all subsequently resolved. With current median follow-

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up of 24 months there are no new GVF defects. Endocrinology results have shown statistically significant reduction in both serum GH (p=0.008) and IGF-1 levels (p=0.005). MRI appearances have been relatively unchanged.

SRT for medically and surgically refractory acromegaly is an effective treatment with minimal visual risk, regardless of proximity to the visual pathways and may be preferable to SRS for selected patients.

B-05

Histopathological examination in routine discectomy: a cost-benefit analysis

AS Wu (Saskatoon), DR Fourney (Saskatoon)*

Background: Routine histopathological examination of intervertebral disc specimens remains common practice in many North American hospitals, but recent studies have questioned the utility of this practice. In this study, we have performed a cost-benefit analysis of this practice. *Methods:* A cost-benefit analysis was performed on previously published data from a retrospective database analysis of routine surgeries (benign indications for surgery) where disc specimens had been sent for histopathological analysis. For comparison we examined non-routine surgeries from the same period (1996 to 2004). Chart reviews were used to determine if any histopathology findings affected subsequent patient care. Total costs were calculated. A literature review was conducted. *Results:* We found 4 unexpected histopathology results out of 1775 specimens obtained from routine cases, one of which was clinically significant. We calculated costs of $42,165.25 per unexpected histopathological finding and $168,625 per clinically significant histopathological finding. For non-routine surgeries, the total cost of histopathological examination was $6650, and the cost per abnormal pathological finding was $116.67. *Conclusions:* In routine cases, histopathological examination of disc specimens is not justified. The decision to send specimens for pathological examination should be based on clinical judgment

B-06

High grade glioma in Canada: are there regional differences?

JF Megyesi (London), C DeSilva* (London)*

Background: Canada is diverse with regional differences in ethnicity, diet and environment. We investigated geographical variation in high grade glioma between St. John's, Newfoundland (STJ) and London, Ontario (LON). STJ is in a relatively pristine environment while LON is more industrialized. *Methods:* Patients treated for high grade glioma (HGG) at LON and STJ between 1998 and 2004 were identified from office charts. Charts were reviewed for patient demographics and presenting symptoms and data analyzed using Chi-Square. *Results:* The chart review produced 137 patients, 73 LON and 64 STJ. The LON patients consisted of 46 males and 27 females with mean age 63.1 years. The STJ patients consisted of 43 males and 21 females with mean age 59.3 years. There was no significant difference in age. However, significantly more patients are under age 60 in STJ compared to LON (p= 0.02). In addition, chi-square analysis revealed STJ and LON patients present differently (p= 0.03). The former tend to present with headache, increased intracranial pressure and seizures while the latter tend to have focal neurological deficits. *Conclusion:* It appears that there are regional differences in the clinical features of HGG. Perhaps additional work should investigate regional differences with the aim of identifying factors responsible.

B-07

Early neurosurgical intervention in the management of central nervous system blastomycosis

G Marchuk (Winnipeg), M Del Bigio (Winnipeg), S Krawitz (Winnipeg), J Embil (Winnipeg), P McDonald (Winnipeg)*

Background: Blastomyces dermatiditis is a dimorphic fungus endemic to specific regions within south-central Canada and the midwestern United States. We present our experience with central nervous system (CNS) blastomycosis to highlight the role of early neurosurgical intervention in its diagnosis and treatment. *Methods:* A retrospective review of all patients diagnosed with *Blastomyces dermatitidis* from 1988 to 2006 was conducted, and patients with CNS infection were selected for further analysis. *Results:* Fifteen patients with CNS blastomycosis were identified. The average age was 32, and 47% were children. Involvement of the parenchyma was the most common clinical manifestation, whereas primary leptomeningeal disease was seen in only 5 patients. Antecedent or concurrent pulmonary infection occurred in less than half of the patients. Neurosurgery was required to make the diagnosis in the majority of cases; blood cultures and repeated CSF sampling were ineffective. All patients were treated with antifungal therapy with resultant improvement or stabilization of neurological symptoms, although one patient died prior to receiving therapy. *Conclusions:* CNS blastomycosis is an important clinical entity, and should be considered in the differential diagnosis of those who have traveled to endemic areas. Neurosurgical intervention plays a predominant role in obtaining adequate tissue to confirm the diagnosis and institute therapy in a timely fashion.

B-08

The role of recombinant activated factor VII in neurosurgery: hope or hype?

GW Hawryluk (Toronto), MD Cusimano (Toronto)*

Recombinant activated factor VII (rFVIIa) is a relatively new pharmaceutical agent developed for use in patients with hemophilia in whom inhibitors to clotting factors VIII or IX have developed. Use of this drug has become common in recent years because of its efficacy and safety in patients with coagulation disorders as well as in patients who are at high risk for thromboembolism, even when other means of establishing hemostasis have failed. The use of rFVIIa in neurosurgery has lagged behind its use in other fields, although there is a growing body of literature on such uses. Here the authors review the history and science of rFVIIa as well as dosing and safety information. Various uses pertinent to the neurosurgeon are reviewed, including the treatment of patients with coagulation disorders, those suffering trauma, and those with perioperative hemorrhage, intracerebral hemorrhage, or subarachnoid hemorrhage. Based on their review of the uses of rFVIIa, the authors conclude that rFVIIa is a safe and effective agent with the potential to revolutionize the treatment of neurosurgical patients with hemorrhage. Cost is a major impediment to the widespread use of rFVIIa, and there is some evidence that its use in the neurosurgical population may be subject to higher risk than in other populations studied thus far. Although

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further study is needed to better delineate the safety and efficacy of the drug in many nonlicensed uses, it is clear that rFVIIa is an agent with tremendous promise.

General Neurology 1

C-01

White matter high signal changes in Parkinson's disease: risk factors and correlates

R Camicioli (Edmonton), WW Martin (Edmonton), T Bouchard (Edmonton), T Green (Edmonton), C Hanstock (Edmonton), N Fisher (Edmonton), D Emery (Edmonton)*

Background: It is unclear if white matter high signal changes (WMC) are increased in PD and associated with vascular risk factors (VRF) and clinical features. *Method:* Patients and controls (>64 years) underwent MRI scans (T2/ FLAIR). WMC were rated in a standard fashion and their relationship to VRF (smoking, blood pressure (BP), basal metabolic index, heart disease, diabetes, cholesterol, C-reactive protein and homocysteine) was determined. Relationship to clinical features (Dementia Rating Scale, Geriatric Depression Scale, motor exam and freezing of gait) was examined in PD. *Results:* 51 PD and 50 controls did not differ demographically (PD: 71.5±4.7; non-PD: 71.5±4.8 years). Patients had lower sitting and standing systolic BP, larger supine-standing BP difference and higher homocysteine. Controls had higher cholesterol and longer smoking history. None of the other risk factors nor WMC differed between groups (WMC PD: 3.66±3.9; control: 3.4±3.1, p=0.71). In PD, WMC were associated with smoking duration (p=0.04) with a trend with supine BP (p=0.06). Freezing was the only clinical feature associated with WMC. No factor predicted WMC in non-PD. *Conclusions:* Risk factors for WMC may differ between PD and controls. In PD WMC were associated with smoking, but not other risk factors or clinical features, except freezing.

C-02

Magnetic resonce imaging of progressive multifocal leukoencephalopathy in HIV positive patients

F Al Azri (Ottawa), T Nguyen (Ottawa), C Lum (Ottawa), W Miller (Ottawa), M Kingstone (Ottawa), J Wolfe (Ottawa), G Jensen (Ottawa)*

Objective: To describe the radiological features of Progressive multifocal leukoencephalopathy (PML) in HIV positive patients with an emphasis on diffusion weighted imaging(DWI), perfusion-weighted imaging(PWI) and MR spectroscopy. *Materials and Methods:* We retrospectively reviewed a series of 6 patients with a pathologically proven diagnosis of PML. CT and conventional MRI images with contrast were obtained in all patients. MR perfusion (TE=47,TR=1320,EPI,0.1mmol/kg,Gadovist) and MR proton spectroscopy (2D CSI, TE=135 and TE=270)was performed in 2 patients. *Results:* All six patients had a presumed diagnosis of PML following the initial CT and MRI examinations. Lumbar puncture was performed in three patients, which was positive for JC virus. On CT, all the patients demonstrated nonenhancing hypodense white matter lesions without significant mass effect. On MRI the lesions appear hypointense on T1 and hyperintense on T2 weighted images. Grey matter and posterior fossa involvement was seen in 2 patients with progression of the disease. On DWI, the lesions appear heterogeneous with a typical area of restricted diffusion at the periphery of the lesions, which also have an increase in cerebral blood volume on PWI. There was increased choline (Cho) peak with decreased N acetyle aspartate (NAA) peak with presence of lactate at the margin of the lesion. *Conclusions:* White matter lesions seen in PML appear heterogenous on MRI, which suggests areas of active and chronic demyelination. This appearance can be further characterized with DWI, PWI and MR spectroscopy. In the appropriate clinical setting, a diagnosis of PML can be made with radiological findings and CSF evaluation for JC virus, avoiding the need for a biopsy.

C-03

Neuropathic pain is common, disabling, and greatly impairs quality of life and earning potential in Albertans: a population-based survey

C Toth (Calgary), J Lander (Edmonton)*

Background: Previous attempts to quantify neuropathic pain (NeP) have relied upon family medical clinic records or prevalence estimates based upon conditions associated with NeP. Greater understanding of the extent of the NeP population and its needs is compulsory in order to determine health care resource allocation requirements. *Methods:* A population study telephone survey laboratory at the University of Alberta contacted 1207 subjects with a normal population distribution, aged 18 years and over. Relevant epidemiological data were acquired, including education level, income level, presence of employment, and determination of the presence of pain and its duration in each subject. In subjects with pain, the history portion of the DN4 questionnaire was administered to derive an estimate of the prevalence of features of NeP and non-NeP. The quality of life (QoL) (EQ-5D) measurements were also acquired in all subjects reporting pain. *Results:* Chronic pain of ≥ 6 months duration was present in 390 subjects (32%). A score of ≥ 3 on the history portion of the DN4 questionnaire, suggesting features of NeP, was recorded in 208 (53%) subjects. Subjects with features of NeP (sNeP) were more likely to be female (62%), under 60 years of age (77%) and were more likely to be unemployed than subjects with non-NeP and without pain. Despite education levels being similar in all groups, sNeP had lower household and individual incomes, as well as lower QoL, particularly in the realms of mobility, pain/discomfort, and anxiety/depression. Younger subjects with NeP had the greatest decline in QoL scores. *Conclusion:* It is possible that NeP is considerably more prevalent in the general population than previously estimated. Most importantly, NeP is most common amongst subjects in their income earning years, leading to loss of income and lowered QoL. Clearly, new strategies are required for the management of the large population of sNeP.

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C-04

Occipital condyle syndrome as the first presentation of disseminated malignancy: two cases and a review of the literature

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Background: Occipital condyle syndrome is characterized by severe, unilateral, occipital headache and ipsilateral twelfth-nerve palsy. It is associated with skull-base metastasis. *Methods:* We identified two patients with sub-acute onset of severe, unilateral, occipital headache and ipsilateral tongue paralysis. The first patient was a 58-year-old woman with a history of non-metastatic small-cell lung cancer in clinical remission. The second patient was an otherwise healthy 36-year-old man. Neither patient had any other findings on general medical or neurological examination. One patient had only equivocal findings on initial magnetic resonance imaging (MRI), and the other patient's MRI was normal. *Results:* Although initial work-up for metastatic disease was normal, the first patient developed severe bone pain over the next few months, and follow-up investigations demonstrated metastases to her spine, tibia, skull base and brain. The second patient improved initially, but was admitted to hospital three months later with constitutional symptoms and pancytopenia. Bone marrow and lymph node biopsies were consistent with Stage IVB Hodgkin's lymphoma. *Conclusion:* Occipital condyle syndrome can be the first presentation of disseminated malignancy. Initial imaging of the brain and skull base may be normal, and recognition of this syndrome warrants thorough investigation and close follow-up.

C-05

Facial nerve pathology associated with cluster headache

DW Rowed (Toronto), JG Edmeads (Toronto)*

Background: The pathophysiology of cluster headache (CH) is imperfectly understood. Parasympathetic and visceral and somatic afferent nerve fibres traveling in the nervus intermedius (NI) may be important. *Methods:* Two cases of hemicranial headache associated with facial nerve pathology are presented. The first is a 34-year-old male with an 18-year history of classical CH ipsilateral to a large vestibular schwannoma. The second is a 43 year old male with a 4 year history of daily left retroorbital headache without autonomic accompaniments, refractory to polypharmacy, with a 4 month complete remission coinciding with ipsilateral Bell's palsy followed by return of headache with motor recovery. *Results:* Complete excision of vestibular schwannoma has resulted in complete freedom from headache for 9 months. Complete NI section in the second case has decreased frequency and severity of headache but not achieved complete relief of pain. *Conclusions:* Facial nerve pathology associated with CH and relief of CH supports the belief that nerve fibres contained in the NI are important in the pathogenesis of CH.

C-06

Diagnostic accuracy of neurological problems by primary care and emergency physicians

JJ Moeller (Halifax), J Kurniawan (Halifax), GJ Gubitz (Halifax), J Ross (Halifax), V Bhan (Halifax)*

Background: Previous studies describe significant rates of misdiagnosis of stroke, seizure and other neurological problems, but there are few studies examining diagnostic accuracy in all emergency referrals to a neurology service. This information could be useful in focusing the neurological education of emergency physicians. *Methods:* All neurological consultations in the emergency department at a major teaching hospital were recorded for six months. For each patient, the initial diagnosis of the requesting physician was compared to the final diagnosis, as determined by retrospective chart review. *Results:* 493 neurological consultations were requested during the study period. The diagnosis of the requesting physician agreed with the final diagnosis in 64.3% (317/493) of cases, and disagreed or was uncertain in 35.7% of cases (19.1% (94/493), and 16.6% (82/493) respectively). Common misdiagnoses included syncope, peripheral vestibulopathy, primary headache and psychogenic syndromes. Often, these were initially diagnosed as stroke or seizure. *Conclusions:* Our data indicate a neurological misdiagnosis rate of over one-third of all emergency neurological consultations. Benign neurological conditions, such as migraine, syncope and peripheral vertigo are frequently mislabeled as seizure or stroke. Educational strategies that stress the emergent evaluation of these conditions could improve diagnostic accuracy, and may result in better patient care.

C-07

Neurology in the developing world: developing a Canadian perspective

P Bailey (Saint John), M Freedman (Toronto), A Kirk (Saskatoon), M Beaulieu (Ottawa), R Desbiens (Quebec), JC Martin del Campo (Toronto)*

One in nine people die of a neurological disorder. Many more live with ongoing preventable neurological sequelae. While cerebrovascular disease is the leading cause of neurological death worldwide, few would suspect that tetanus is second on the list. Anencephaly kills more than epilepsy and spina bifida more than multiple sclerosis.

Developmental delay secondary to malnutrition is the most prevalent neurological problem in the world followed by epilepsy and neurotrauma. In nearly every case the vast burden of neurological disease falls on the developing world. For example, 50 million people worldwide have epilepsy and 80% live in the developing world. Less than 20% get adequate treatment. Only one in five stroke deaths take place in the developed world.

The Canadian Neurological Society has established The Canadian Neurological Society International Development Committee to begin tackling our obligation to the developing world in collaboration with the World Federation of Neurology

This poster will outline the initial deliberations of the committee: Our attempts to develop a sustainable program in Cuba and an invitation for interested neurologists to join in this endeavor.

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C-08

Cerebral venous thrombosis in Singapore, 1994-2007

H Chua (Singapore), J Chai (Singapore)*

Introduction: Cerebral venous thrombosis is an uncommon disorder with varied clinical manifestations. *Methods:* We retrospectively reviewed the Department Registry of records over the last 15 years. *Results:* There were 41 patients (23 female, 18 males) and ages ranged from 21-81 years. Presentation: seizures (73%), headaches (68%), unconsciousness (51%), focal deficits (49%), vomiting (46%). Predisposing factors: none (44%), pregnancy (12%), prothrombotic (12%), contraceptive pills (10%), thyrotoxicosis (10%), malignancy (10%), mastoiditis (2%). CT scan: hematoma (44%), cerebral edema (39%), empty delta (32%), dense triangle (29%), SAH (24%), venous infarct (15%), cord sign (7%). Location of thrombosis on MRV / CT venogram / angiography: sagittal sinus (95%), either right or left transverse sinus (80%), both transverse sinuses (40%), straight sinus (22%). Treatment: anticoagulation (85%), 3 patients received thrombolytics and of these 2 died. Outcome at discharge: Modified Rankin Scale: 0-2 (54 %), 3 (10 %), 4-5 (29 %), died from illness or complications (7 %).

We had 2 unusual cases: the first was a 45 year-old man with seizures, dehydration, thyrotoxicosis, and had both arterial and venous infarcts on MRI. The second was a 47 year-old female with headaches for 2 weeks which worsened acutely over one day. She had both cerebral venous thrombosis and spontaneous intracranial hypotension on MRI / MRV. *Conclusion:* A high index of suspicion is required in view of myriad presentation. Do remember this diagnosis in stroke patients who present with seizures and headaches.

General Pediatric Neurology

D-01

Neonatal Arterial Ischemic Stroke in the Canadian Registry

G deVeber (Toronto), C Group (Toronto)*

Background: With an incidence up to 1:2500 live births, neonatal arterial ischemic stroke (AIS) is common. Population-based epidemiology on risk factors, treatment, and outcomes is lacking but necessary for clinical trial development. We report the largest cohort of neonatal AIS to date. *Methods:* Children with radiographically confirmed AIS were ascertained across all 16 Canadian tertiary care pediatric centres (1992-2002) by site investigators and ICD-9/10 searches. Standardized data on risk factors, presentation, treatment, and outcome were collected on-site. *Results:* Of 1032 children with AIS enrolled in the Canadian Registry, 342 (33%) were neonates including 233 with acute neonatal AIS and 109 with presumed perinatal infarction (PPERI). Only 33% of neonatal AIS were symptomatic of established risk factors such as cardiac (26%) or prothrombotic disease (24%). At a mean follow-up of 2.2 years, outcomes were death (9%), neurological deficit (64%), and epilepsy (17%). On multivariate analysis, duration of follow-up was strongly predictive of poor neurological outcome (p=<0.0001). Recurrent AIS was rare, occurring in <1% (1/194) of survivors though another 13(7%) had further non-cerebral thrombotic events. *Conclusions:* AIS is an important cause of perinatal brain injury. Recurrence is rare but prolonged follow-up is required as deficits emerge over time in most survivors.

D-02 *President's Prize Winner - CACN*

Novel corticospinal tract pre-wallerian degeneration in pediatric stroke: acute MRI prediction of outcome and TMS correlates of reorganization.

A Kirton (Toronto), T Domi (Toronto), R Chen (Toronto), M Shroff (Toronto), C Gunraj (Toronto), E Kouzmatcheva (Toronto), G deVeber (Toronto)*

Background: Diffusion MRI (DWI) demonstrates pre-wallerian degeneration in descending corticospinal tracts (DCST) in neonatal arterial ischemic stroke (AIS) and predicts poor outcome. This signal is unstudied in older children and implications for reorganization are unknown. *Methods:* A consecutive AIS cohort (1mo-18yrs) with acute DWI and >12months follow-up were enrolled (SickKids Children's Stroke Program). A validated software technique quantified DCST DWI variables and correlations to the Pediatric Stroke Outcome Measure (PSOM) were sought. Reorganizational patterns were evaluated using transcranial magnetic stimulation (TMS). *Results:* DCST DWI signal was detected in 20/29 children (69%), with 85% suffering poor motor outcome. DCST variables correlated with hemiparesis included: (1)Any DCST, (2) any midbrain, (3) % peduncle (4) vertical length, and (6)r elative volume affected (all p<0.003). DCST signal increased over time, outlasted infarct changes, and was difficult to appreciate on visual inspection. Unexpectedly, DWI signal was detected in the contralesional DCST in 7 children, all with severe hemiparesis. Using TMS, no pathological ipsilateral CST projections were detected in 4 of these 7 children. *Conclusions:* DCST DWI signal is an acute predictor of motor outcome in childhood stroke and can help guide management. Previously unrecognized contralesional DCST signal predicts a severe outcome and does not appear to represent maladaptive recruitment of ipsilateral DCST projections.

D-03

Decompressive hemicraniectomy for malignant hemispheric infarction in children

V Ramaswamy (Edmonton), V Mehta (Edmonton), LP Richer (Edmonton), P Massicotte (Edmonton), JY Yager (Edmonton)*

Background and Objectives: Stroke in children is increasingly recognized. Outcome in children remains uncertain, though recent reports suggest abnormalities in approximately 60%. The approach to and outcome of severe, malignant strokes in children is unknown. Studies in adult hemispheric infarction have suggested that decompressive hemicraniectomy is a reasonable life-saving treatment option. Here we report on our experience with decompressive craniectomy in 3 children. *Methods:* Retrospective Case Series *Results:* Three patients with hemispheric infarction who underwent decompressive craniectomy were identified. All three patients had different etiologies for their infarction. The first patient, age 9 suffered a massive intra-operative right MCA stroke with left MCA and bilateral intravascular watershed zone involvement during surgery to replace a pulmonary valve. The second patient, age 4, presented with a unilateral fixed pupil and ruptured aneurysm who

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suffered a large dominant hemisphere infarction post aneurysmal repair. The third patient, age 13, presented with a large right anterior MCA and partial ACA infarct likely secondary to an arteriopathy of the right ICA. All three patients experienced severe cerebral edema with increasing intra-cranial pressure, and an impending fatal outcome. All of the children had their hemicraniectomies within 48 hours of the infarction. All three patients had an uncomplicated post-operative course. All patients recovered from their operation and stroke. Despite massive MCA infarction, all patients were ambulant and able to speak at the time of follow-up. None of the patients has had seizures to date. *Conclusions:* Though a limited experience, decompressive hemicraniectomy is a life-saving and viable approach to malignant stroke in children. Moreover, outcomes were very good in all three of our cases, even in the short term. Larger studies are required to determine clinical markers of positive outcome, in this population of children experiencing stroke.

D-04

Neuroimaging challenges in the diagnosis of pediatric arterial ischemic stroke

A Pontigon (Toronto), M Rafay (Winnipeg), J Chiang (Toronto), M Adams (Toronto), A Jarvis (Toronto), F Silver (Toronto), G deVeber (Toronto)*

Background: Diagnosis of Arterial Ischemic Stroke (AIS) in children is based on both clinical suspicion of stroke and neuroimaging confirmation. We sought to determine time delays and inaccuracies associated with neuroimaging. *Methods:* Consecutive children with AIS, admitted to The Hospital for Sick Children (HSC) from January 1992 - December 2004, were studied. Data on presentation, symptoms, hospital arrival, and neuroimaging were recorded. *Results:* We studied 209 children with AIS wherein 146 (70%) had some delay related to neuroimaging with median time from symptoms to diagnosis of 33hours (range 30mins-7.3days). Initial CT/MRI confirmed AIS in 110 (53%) children (107 of 206 CT and 3 of 3 MRI) and was reported suspicious for AIS in 17 (8%) children. In the 82(29%) remaining patients, initial CT was interpreted as normal in 50 (includes 11 scans subsequently read as AIS) and misread abnormal(abnormal not attributed to AIS) in 32 children. 54% of misread scans were interpreted at local or nearby hospitals. *Conclusion:* Majority of neuroimaging related delays in our cohort were missed or incorrect diagnoses due to either low sensitivity of CT scan or false interpretation. Efforts to use more sensitive and specific neuroimaging modality and pediatric neuroimaging expertise for interpretation of acute infarction can reduce diagnostic delay and optimize management of AIS in children.

D-05

Chronic daily headache (CDH) in children and adolescents: a prospective Saskatchewan study

SS Seshia (Saskatoon), DF Phillips (Saskatoon), CL von Baeyer (Saskatoon)*

Background: CDH is gaining recognition as a common headache disorder in childhood. Transformed Migraine is considered the most frequent type. *Material and Methods:* Data on children (< 18 years of age) attending the first author's headache clinic at the Royal University Hospital, Saskatoon, were collected prospectively and sequentially from February 2004 to July 2006. Standardized data sheets and definitions were used. *Results:* 73 (33%) of 221 children referred for headache had CDH. There was a significant excess of females (N=50) over males (N=23); 56 (77%) had had recurrent headache for 3 months to 12 years before transformation to CDH and 23% had new-onset CDH. The median age of onset of CDH was 7 years (range: 4-17 years). Forty-seven (64%) had mixed migraine and tension-type (TT). Sixty-four (84%) had a primary headache disorder. Analgesia over-use occurred in 29%, stressors, often multiple, were identified in 68%, anxiety in 13 (22%), depression in 14 (19%). *Conclusions:* Our observations on the prairies of Canada suggest: (i) Most children with CDH have features of migraine and TT rather than migraine alone, and (ii) anxiety, depression and stressors are frequently associated with CDH. CDH must be viewed from a biopsychosocial rather than a narrow biomedical perspective.

D-06

Head and neck infections in children with cerebral sinovenous thrombosis

L Billinghurst (Edmonton), G deVeber (Toronto)*

Objective: To characterize the occurrence of head and neck infections in children with cerebral sinovenous thrombosis (CSVT). *Methods:* The Canadian Pediatric Ischemic Stroke Registry was initiated in 1992 at the 16 pediatric tertiary care centers in Canada. Children (newborn-18 years of age) with symptoms and radiographic confirmation of CSVT were enrolled. *Results:* From 1992-2001, 318 children with CSVT were identified. 57 (18% of cohort) had head or neck infections confirmed before or simultaneous to the diagnosis of SVT. Affected individuals were primarily older children (mean age 5.5 years) with otitis media (OM) and/or mastoiditis (61%, n=35). Of these, 51% were treated with oral antibiotics prior to their CSVT, 33% had a history of recurrent OM and/or prior otolaryngologic surgery, and 43% required surgical intervention. Venous infarction occurred in 14 children (25%) and two children died. One-half of all children had additional risk factors for CSVT including chronic systemic disease, pro-thrombotic states, malignancy, or iron-deficiency anemia. 13 children (23%) had neurologic sequelae at follow-up despite aggressive antibiotic therapy, surgery and anti-coagulation. *Conclusion:* CSVT following head and neck infections primarily affects older children with OM and/or mastoiditis, many of whom have additional pro-thrombotic risk factors. Head and neck infections are a common, and perhaps preventable risk factor for CSVT in children.

D-07

Symptomatic white matter injury following methotrexate treatment in childhood

N Makhani (Toronto), J Hukin (Vancouver)*

Background: Subacute methotrexate neurotoxicity can present with transient focal neurologic deficits. This syndrome has been incompletely characterized, and little is known about long-term neurological status. *Methods:* We identified 7 children affected since 1998 through our neuro-oncology database. Their medical records were retrospectively reviewed. *Results:* 6 of 7 children were male and their median age was 14 years (range 5-17 years). Symptoms included unilateral or bilateral paresis, aphasia, visual field and

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hemisensory deficits occurring 4-7 days after intrathecal (n=6) or intravenous (n=1) methotrexate. Mean time to resolution was 5 days. Leucovorin, dextromethorphan, or intravenous steroids were administered in some cases. All children displayed T2 white matter abnormalities on MRI, predominantly in a distribution correlating with clinical deficits, though findings were delayed by 10 days in one case. No abnormalities in serum methotrexate, folate or homocysteine levels were detected. One child was vitamin B12 deficient. Of the 6 children followed beyond one year, three were normal, two had residual neurologic deficits, and one died of leukemic relapse. *Conclusions:* Transient focal neurologic deficits secondary to white matter injury are most common in adolescent boys, especially after intrathecal methotrexate administration. The appearance of MRI abnormalities may be delayed by several days. In contrast to earlier reports, we show that neurologic deficits sometimes persist.

D-08

Gestational diabetes mellitus : risk of newborn brain injury

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Background: Although infants born to mothers with gestational diabetes mellitus (GDM) have increased morbidity and mortality, the pathogenesis and patterns of brain injury observed in affected newborns have not been well described. The purpose of this study is to describe the spectrum of brain injury in a cohort of term newborns born to mothers with GDM. *Methods:* Retrospective review of neuroimaging and clinical data of a cohort of term newborns born to mothers with GDM was compared to controls. Neuroimaging abnormalities were correlated with clinical information, e.g., dietary/insulin therapy, glycemic control, fetal growth, congenital anomalies. *Results:* Of 52 term newborns born to mothers with GDM, 44(85%) had abnormal neuroimaging. Eight(15%) had intrauterine injury: meningomyelocoele(3), hydrocephalus(2), cortical dysplasia(1), calcifications(2). Intracerebral hemorrhage occurred in 11(21%), including severe intraventricular hemorrhage secondary to persistent germinal matrix hemorrhage(IVH/GMH)(6). Five(10%) had hypoxic-ischemic injury to thalami/basal ganglia with associated white matter injury. Isolated white matter abnormality was observed in 12(23%). Less common abnormalities included arterial infarction in multiple vascular territories(2), extensive venous infarction(1) which were associated with polycythemia and cardiac anomalies, and hypoglycemic changes(2). *Conclusions:* Term newborns of mothers with GDM are at high risk for significant brain injury. The pattern of predominant white matter injury and the high prevalence of GMH/IVH in affected term infants is consistent with delay in cerebral maturation.

D-09

A phenomenological study on parental experience in pediatric neuromuscular disorders

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Background: This study aimed to understand the experience of parents caring for children with neuromuscular disorders (NMD) on home mechanical ventilation (HMV) in order to identify strategies that could lead to improvements in service delivery and support for these families. *Methods:* Data was collected from semi-structured interviews in the families' homes and analyzed using a phenomenological approach. *Results:* Fifteen families participated in the interviews, including the parents of three boys with Duchenne muscular dystrophy, four girls and one boy with spinal muscular atrophy, and seven children with other NMD. The parents considered their child's life and quality of life (QoL) as valuable. The families' lives changed due to HMV, and these changes had become part of their "normal" routine. Despite being experts on their child's care, the parents continued to experience a recurrent sense of loss. Those who perceived that they were not sufficiently supported felt the weight of responsibility as the sole care providers for their child with NMD. *Conclusions:* The central meaning of being the parent of a child with NMD on HMV was being the "lifeline" for their child's life and QoL. Beyond recognizing the parents as experts, they need our support to fulfill this vital role.

STROKE

E-01

The Transcranial Doppler (TCD) flow finding at the site of occlusion predicts response to intravenous stroke thrombolysis

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Background: We examined TCD flow at occlusion's site in predicting outcome in stroke patients receiving IV rt-PA. *Method:* TCD performed before rt-PA started. We used TCD flow at occlusion's site (Thrombolysis in brain ischemia (TIBI)) grading system. Poor outcome was defined as mRS 2 at 3 months. We compare rate and time of recanalization, and long term outcome with TIBI flow grade. Then, stepwise logistic regression was used to determine predictors of complete recanalization. *Result:* 369 patients received rt-PA at 142±60 minutes (median NIHSS 16). Fifty seven out of 75(76 %) patients with no flow (TIBI 0) at occlusion's site, 72/104(69 %) with minimum flow (TIBI 1), 43/66(65%) blunted flow (TIBI 2) and 30/57(53%) dampened flow (TIBI 3) had poor outcome.(P=0.04) 17/98(17%) patients with TIBI 0, 44/127(35 %) TIBI 1, 29/78(37%) TIBI 2 and 31/66(47%) TIBI 3 had complete recanalization.(p< 0.001) In stepwise logistic model, NIHSS, SBP, Glucose and TIBI grade were negative predictor of recanalization. The worse TIBI flow, the less likelihood of recanalization.(p=0.028) Median time to recanalization in patients with TIBI 0 is 155 minutes (range 104-190) and with TIBI 1 120 minutes (60-172).(P=0.027) *Conclusion:* TCD flows at occlusion's site predict rate, time of recanalization and outcome.

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E-02

Magnetic resonance molecular imaging of endothelial activation in acute stroke

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Background: The aim of this study was to visualize endothelial activation in a mouse model of stroke using a P-selectin-specific iron oxide nanoparticle MRI contrast agent (MNP-Psel). *Methods:* MNP-Psel was compared to the non-targeted iron oxide agent Feridex (Berlex). The left middle cerebral artery was transiently occluded for 30 minutes in male C57 Black 6 mice. After reperfusion, mice received 2.8 mg Fe/kg of either Feridex or MNP-Psel and MRI scans were acquired at 9.4T. Subtraction maps (pre-contrast - post-contrast) were used to identify areas with differences in T1, T2 and T2*. Sections through the cortex and striatum were taken for iron histochemical staining by the Prussian blue method. *Results:* T1 values were unaffected by MNP-Psel or Feridex. T2 and T2* decreased preferentially in the stroke hemisphere with MNP-Psel but not Feridex. Brain sections from MNP-Psel-injected mice showed endothelial iron accumulation in the stroke hemisphere. *Conclusion:* Prolonged T2 and T2* shortening within the stroke hemisphere was accompanied by endothelial accumulation of iron after MNP-Psel injection suggesting that MNP-Psel binds to P-selectin expressed on activated endothelium. This demonstrates the potential use of targeted iron oxide contrast agents to visualize in vivo endothelial activation in acute stroke.

E-03

Matrix metalloproteinase-3 is neurotoxic in cell culture and in intracerebral hemorrhage in mice

M Xue (Calgary), V Yong (Calgary)*

Intracerebral hemorrhage (ICH) involves thrombin and matrix metalloproteinases (MMPs). As MMP-3 expression is correlated with poor prognosis in human ICH, we tested whether MMP-3 has toxic effects on neurons, particularly in combination with thrombin or MMP-9.

In culture, human fetal neurons were exposed to MMP-3, thrombin or MMP-9, alone or in combination. Immunostaining was used to examine neuronal survival. In vivo, 10-µl of autologous blood was injected into the right striatum of mice to produce ICH. 24-hours after ICH, mice were perfusion-fixed and brain sections were stained to quantify lesion area, neuronal death, and inflammation.

Dose-dependent toxicity of MMP-3 was observed in culture. The combination of MMP-3 with thrombin or MMP-9 was more toxic than each reagent alone; toxicity was most marked when all three reagents were combined. In mice, brain damage was significantly reduced in MMP-3 null mice. The brain damage and neuronal death of thrombin injection were significantly lower in MMP-3 null mice. The brain damage and neuronal death were least in MMP-3 null mice treated with hirudin (thrombin inhibitor).

These results suggest that MMP-3 and thrombin have an additive effect on neuronal death in vitro, and that they play important collaborative roles in brain damage following ICH.

E-04

Multiple interventions for neuroprotection utilizing thermal-regulation in the emergent treatment of stroke: the MINUTES study

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Background: The MINUTES study is the first clinical trial utilizing combination therapy and pre-hospital administration (when possible), to address factors of lesion complexity and duration to treatment as important targets in neuroprotective treatment strategies. We present methodology and preliminary results from this Phase 1 study. *Methods:* Study Design: Open label randomized study, with regards to treatment allocation. A total of 70 patients will be enrolled. Follow-up is blinded to treatment. Inclusion- Cortical stroke, within 12 hours onset or 6 hours from awakening from sleep. Multi-treatment protocol- 1. Two 2g i.v. boluses of Magnesium Sulfate; 2. Albumin 1.75g per kg i.v as a single dose; 3. Minocycline 200 mg bid for 7 days; 4. Atorvastatin 80mg daily for 7 days; 5. 12h Local Cerebral Hypothermia. Outcome Assessments-NIHSS 48h, 1 wk and 90 days. Modified Rankin 1 wk, 30 and 90 days. Barthel Index, 30 and 90 days. *Summary:* Thus far, n=15 (9 treatment, 6 control). Treatment components received in completion, (7/9, 78%) or partial completion in all 9. No significant difference in mortality (22%treat./17%cont., p=.792). Poor outcome (MR90d>2) in controls/treatment; 100%/67%, p=0.1. *Conclusion:* Preliminary data suggests viability and safety of the MINUTES protocol with an early trend towards efficacy.

E-05

The Combination of Clinical features, Transcranial Doppler and ASPECTS score in predicting outcome in IV rt-PA treated patients

S Husain (Edmonton), AV Alexandrov (Phoenix), AM Demchuk (Calgary), G Tsivgoulis (Phoenix), A Shuaib (Edmonton), M Saqqur (Edmonton)*

Background: Many modalities are available for assessing acute stroke patients. However, little data exists on using combined information from these modalities to predict outcome. *Methods:* Stroke patients received IV tPA and had TCD examinations within 3 hours of symptom onset. TCD were interpreted using Thrombolysis in Brain Ischemia (TIBI) flow grading system. Following multiple regression analysis, a grading system was created with one point for each of: NIHSS score ≥ 15, TIBI ≤ 1, and Alberta Stroke Program Early CT Score (ASPECTS) ≤ 6. Patients' scores were compared to modified Rankin scale (mRS) scores at 90 days. *Results:* 349 patients treated in four academic centers were included. Overall, 135 (38.7%) patients had good outcome (mRS ≤ 2). In a multiple regression analysis, an ASPECTS ≤ 6, NIHSS score ≥ 15, TIBI ≤ 1, and hyperglycemia on admission were independently predictors of poor outcome ($p<0.05$). Based on our scoring system, patients odds ratio (OR) for poor outcome were 2.9 (NS, p=0.052), 6.1 (p=0.01) and 46 (p=0.01) for a score of 1, 2 and 3 respectively. *Conclusion:* A multimodal grading system is useful in predicting outcome in

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patients treated with IV tPA. Those with higher scores might benefit from further interventional therapy.

E-06

Quantified T1 and T2 as useful adjuncts to DWI for early infarct detection in permanent and transient MCAO

J Kaur (Calgary), U Tuor (Calgary), Z Zhao (Calgary), H Assem (Calgary), J Lee-Petersen (Calgary), T Foniok (Calgary), P Barber (Calgary)*

Background: Knowledge of differences in acute MR imaging changes between transient and permanent ischemia remain incomplete. We hypothesized that quantified T1 and T2 can be useful adjuncts to DWI for early detection of reperfusion injury or infarction. MR changes were measured in transient and permanent MCAO, using high-resolution quantified T1, T2 and ADC. *Methods:* Rats underwent permanent or transient MCAO. 30 min post-occlusion, MR sequence images were acquired: T1 map, T2 images and ADC map at 1.5h, 2.5 h and 24 h following MCAO. T1, T2 and ADC were measured in the infarct. *Results:* In both paradigms, early T1 changes were observed at a time when no T2 or ADC changes existed. In permanent MCAO, T2 demonstrated insignificant increases between 1.5 to 2.5 h. In transient MCAO, following reperfusion; early changes in T2 evolved over time. No significant changes occurred in ADC in permanent ischemia, however, in transient MCAO, statistically significant changes at 1.5 and 24 h time points were observed. *Conclusion:* Early extensive changes in T1 occurred in both models, prior to the onset of cytotoxic or vasogenic edema. Observed changes are likely related to reduced blood flow and increase in water content with intact BBB. T1 may be a useful adjunct for detecting early ischemic injury and defining ischemic penumbra.

E-07

Intracranial nonocclusive thrombus on CT angiography: reason to be concerned?

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Background: The impact of intracranial nonocclusive thrombus (iNOT) in acute ischemic stroke is unknown. We sought to determine the clinical course of patients with iNOT diagnosed by CT angiography (CTA). *Methods:* Six hundred sixty-five patients underwent CTA for acute ischemic stroke from 06/02 to 03/06. We identified iNOT from CTA reports and analysed the clinical data of these patients. *Results:* Twenty-six patients (3.9%) had iNOT on CTA (median age 65.5 years, NIHSS score 3, onset to CTA time 175 minutes). Six patients suffered an early recurrent stroke after a median time of 20.5 hours (0-72). One of them was successfully treated with intraarterial Alteplase and improved to functional independence. The other 5 patients remained dependent. We performed repeated vascular studies in 22/26 patients. In patients with unchanged or enlarged iNOT, 4/9 (44%) suffered early recurrent stroke. Only 1/13 (8%) patients with diminished or resolved iNOT suffered a recurrent stroke and this involved a different vascular territory. All patients without early recurrent stroke were independent at discharge. *Conclusion:* Presence of iNOT represents a group of patients at risk for stroke recurrence or progression. Although a majority are associated with good outcome the subgroup with persistent iNOT appears to be at risk.

E-08

Correlation of the ankle brachial pressure index and the Framingham's risk score among patients admitted under the internal medicine service of the Cebu Velez General Hospital from November 2005 - March 2006

MT Cardino (Cebu), A Junia (Cebu), M Donaldo (Cebu)*

Context: The American Heart Association recommends the estimation of the cardiovascular risks of patients using the Framingham risk score (FRS). The ankle brachial pressure index (ABPI) is also an independent predictor of cardiovascular events. Unlike the FRS estimation which requires laboratory results, the ABPI is a simple, non-invasive procedure with a high patient acceptability. *Objective:* To determine the correlation of the FRS and the ABPI. *Design:* Analytical cross-sectional study *Participants:* Patients admitted under the Internal Medicine service if they were 40 years and above. *Exclusion criteria:* CTD, pregnancy, amputation of one or more limbs, and ABPI of > 1.4. *Methodology:* Subjects were individually interviewed through a risk survey form and FRS computed. ABPI was done by another researcher. Each researcher was blinded accordingly. Ethics approval and consent were sought. *Statistics:* The results were encoded using the SPSS version 10. Chi Square test was utilized to determine the association of the different cardiovascular risk factors and the ABPI. The relationship between the FRS and the ABPI was determined using the Pearsons correlation. After a linear correlation was established, the slope and y intercept were identified and the regression equation was devised. *Results:* There were 412 patients enrolled in the study. Three patients were excluded because they had an ABPI of >1.4. There was a good correlation between the FRS and ABPI. The Pearsons correlation coefficient was (-) 0.535 indicative of moderate inverse correlation with a p value < 0.01. Linear regression analysis was applied and the regression equation was devised to predict the FRS using the ABPI as the dependent variable. Our equation was Y = 30.4 + [(-20.8)X] otherwise known as the Cardino-Junia-Donaldo Equation; where Y is the predicted FRS and X the ABPI. The analysis of the residuals showed that the equation was a good fit to the sample. *Conclusion:* There was a good correlation between the FRS and ABPI.
Recommendation: Validation of the Cardino Equation is currently underway at CVGH.

E-09

Rapid cognitive improvement in a patient with Susac Syndrome following plasma exchange: a case report

FJ Mateen (Rochester), A Zubkov (Rochester), GW Petty (Rochester), J Fulgham (Rochester)*

Background: Susac Syndrome (retinocochleocerebral vascuolopathy) is a rare condition marked by subacute cognitive decline, visual loss due to retinal branch occlusions, and sensorineural hearing loss. The pathogenesis and best treatment for Susac Syndrome are unknown. *Case Report:* A 44-year-old female office worker with a history of migraines presented with a 3-month history of progressive and severe cognitive decline with urinary

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incontinence. She continued to decline after receiving intravenous steroid treatment, approximately 1 month prior to presentation, and in spite of taking high-dose oral steroids.

She scored 2 out of 34 points on the Kokmen Short Test of Mental Status (STMS); produced fluent, nonsensical speech; and had a generalized hyperreflexia with bilateral plantar extensor responses. Upon diagnosis of Susac Syndrome, she received 7 plasma exchange treatments. Her STMS score increased with complete orientation, abstraction, and attention, and she produced fluent, sensical speech. *Discussion:* There is no standard course of treatment in Susac Syndrome, although most reported cases have been treated with prednisone. This patient demonstrated rapid and dramatic cognitive improvement following plasma exchange with fresh frozen plasma but had no significant response to earlier high-dose intravenous prednisone. The institutional experience of Susac Syndrome, especially those treated with plasma exchange, will be reviewed in the context of our case.

Multiple Sclerosis

F-01

T1 Gd-enhancing lesion number and new T2 number are reduced when minocycline is combined with glatiramer acetate

LM Metz (Calgary), D Li (Vancouver), A Traboulsee (Vancouver), M Myles (Edmonton), P Duquette (Montreal), J Godin (Montreal), M Constantin (Montreal), VW Yong (Calgary)*

Background: Glatiramer acetate (GA) reduces clinical and MRI activity in RRMS. Recently minocycline was shown to reduce enhancing MRI activity in a pilot trial. Animal studies support an increased benefit from the combination. *Methods:* To evaluate the add-on effect of minocycline in subjects initiating treatment with GA RRMS patients (n=44) with one or more T1-enhancing lesions on their screening MRI were randomized to either GA 20 mg daily + minocycline 100 mg twice daily or GA + placebo. Subjects were assessed clinically and by MRI at screening and months 1, 3, 8 and 9. The primary outcome was the total number of T1 enhancing lesions at months 8 and 9. *Results:* Forty subjects completed the study. At baseline T1-enhancing lesion number was greater in the GA/minocycline group (median 3 versus 2; mean 7.62 versus 2.43 (p=0.07)) but the number of T1-enhancing lesions was still reduced by 63% (mean 1.47 versus 2.95; p=0.08) and the number of new T2 lesions was reduced by 65% (mean 1.84 versus 5.14; p=0.06) at months 8 and 9 in the GA/minocycline group. Relapse risk was also reduced by 42% (0.19 versus 0.41; p=NS). Treatment was safe and well tolerated. *Conclusions:* A trend to significance on both primary and secondary end-points, despite imbalance at baseline, reflects a consistent pattern of benefit favouring the combination of GA and minocycline. As minocycline is a safe, well-tolerated and inexpensive therapy further study of this combination is warranted.

Supported by Teva Neuroscience Canada

F-02

The Geospatial Relation between ultraviolet radiation and multiple sclerosis in Newfoundland

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Background: It has been postulated that the occurrence of multiple sclerosis (MS) could be associated with daily ultraviolet exposure. In this study we investigated the geospatial association between average daily ultraviolet B (UVB) irradiance and MS prevalence in Newfoundland and Labrador (NL), Canada. *Methods:* A complete list of patients diagnosed with MS in the province of NL was constructed. Places of habitation from birth to diagnosis were ascertained by mailout survey. *Results:* A 74% rate of return on the survey results was obtained. A plot of the average daily erythemal UV over the available five years (1998-2002) shows that the distribution of MS shows a north-south gradient. Average daily UVB measurements are lower in the higher latitudes. A statistically significant negative correlation of MS incidence with erythemal UVB was found that is stronger than the correlation using latitude. This correlation appears to be strongest in the first year of life and declines when subsequent years are examined up to age ten. No significant correlation was found for the subjects' locale of habitation at the time of their first MS attack. *Conclusions:* This study suggests that UVB radiation may contribute to the pathogenesis of MS.

F-03

Neuroprotection by minocycline occurs without the intermediary of microglia

S Liu (Calgary), E O'Ferrall (Calgary), W Yong (Calgary)*

Background: Minocycline has been reported to have neuroprotective activity in various animal models of neurological disease. The inhibition of microglia activity by minocycline has received much attention as a mechanism for neuroprotection but whether minocycline has direct action on neurons to promote their survival is unclear. We tested the hypothesis that minocycline can be neuroprotective without the intermediary of microglia, and that minocycline achieves this by altering neuronal gene expression. *Methods:* Enriched human fetal neuron cultures (HFNs) were pre-treated with minocycline before the treatment with the cytotoxic agent, hydrogen peroxide (H_2O_2). Relative intensity of neuronal markers was then measured with In-Cell westerns. Gene expression profiles of minocycline treated HFNs were generated using microarrays. *Results:* Using HFNs with negligible numbers of microglia, we show that H_2O_2 is neurotoxic by promoting cell loss, and causing decreases in intensity of neuronal markers and decrease of active caspase-3. The presence of minocycline significantly attenuates the effects of H_2O_2. Microarrays identify over 60 up-regulated and 20 down-regulated genes by minocycline within 6 hours treatment. *Conclusion:* Minocycline confers direct protection of HFNs against H_2O_2 without the need of microglia activity, and partly through the inhibition of neuronal caspase-3 pathway. Down-regulated gene targets from microarray studies may have relevance to the mechanisms of minocycline protection and are prospects for future studies.

Supported by a grant from the Canadian Institutes of Health Research.

F-04

1000 IU of daily vitamin D is usually too little to attain a minimally adequate 25-hydroxyvitamin D level in Multiple Sclerosis patients

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Background: Evidence supports a role for vitamin D in reducing Multiple Sclerosis (MS) risk but it is unknown if it affects severity. While all Calgary MS clinic patients have been advised to take at least 1000 International Units (IU) of vitamin D daily, it is known that this dose may not result in adequate serum levels. Expert opinion suggests 80 nmol/L as the lower limit for optimal serum 25-hydroxyvitamin D [25(OH)D]. The primary aim of this analysis was to estimate the prevalence of vitamin D insufficiency in our MS population despite use of supplementation. *Methods:* Consecutive patients were invited to participate in this study to monitor optimization of their vitamin D level between September 2006 and January 2007. *Results:* Baseline data are available on 187 participants. Median age was 47 years (range 21-72 years); 79.7% were women. Mean daily vitamin D dose was 1234.6 IU (range 0 to 4400 IU), 59.4% of patients were taking at least 1000 IU; 13.4% reported missing more than 2 doses a week. Overall mean 25(OH)D level was 72.5 nmol/L (range 17.9-160.0 nmol/L) and median was 69.7 nmol/L. In patients taking at least 1000 IU of vitamin D the mean 25(OH)D level was 79.9 nmol/L (range 22.4-160.0 nmol/L) and median was 74.4 nmol/L. *Conclusions:* The majority of participants had suboptimal 25(OH)D levels; 40.6% were taking less than the recommended dose. Suboptimal levels occurred in 54.1% of those participants taking at least 1000 IU a day. Ongoing work will determine if the baseline level can predict the dose of supplementation needed to achieve optimal status.

F-05

Macrophages stimulated by glatiramer acetate produce growth factors for oligodendrogenesis

C Silva (Calgary), V Skihar (Calgary), W Yong (Calgary)*

Background: Myelin formation in development or during repair is enabled by oligodendrocytes that mature from oligodendrocyte precursor cells following exposure to growth factors. As inflammatory cells produce growth factors, we tested the hypothesis that the MS medication, glatiramer acetate (GA), alters the levels of growth factors for oligodendrogenesis by acting through macrophages known to be present at remyelinating lesions. *Methods:* Bone marrow derived macrophages from mice were treated for 6h to 3 days with GA. Cultures were contrasted by GeneArraysR. In vivo, mice with demyelination of the spinal cord caused by lysolecithin were injected daily for 7 days with GA or saline. Spinal cord sections were then analyzed for the number of OPCs. *Results:* Macrophages treated with GA elevated their levels of IGF-1, PDGF, LIF and several fibroblast growth factors after 24h. In vivo, IGF-1 labeling was evident in lesions, in areas consistent with macrophage accumulation. GA treatment of mice following lysolecithin-injury significantly increased the number of OPCs ($p<0.01$) compared to saline controls. *Conclusions:* Our results indicate that besides affecting T cells, the increase of growth factors for oligodendrogenesis by macrophages is an additional mechanism of the effectiveness of GA in MS. In demyelinating lesions, GA treatment may promote oligodendrogenesis and myelin repair.
Supported by an operating grant from Teva Pharmaceuticals, Israel.

F-06

EMMPRIN-dependent Early Metalloproteinase Regulation in Murine Experimental Autoimmune Encephalomyelitis (EAE)

SM Agrawal (Calgary)*

Metalloproteinases have been shown to have detrimental roles in neuroinflammatory diseases such as Multiple Sclerosis (MS). Much progress has been made in the understanding of their mode of action and protease activity; however, the fact that metalloproteinases interact with and compensate for each other have made them confounding to work with.

In order to investigate the role of many metalloproteinases simultaneously, we have targeted an extracellular matrix metalloproteinase inducer (EMMPRIN). EMMPRIN found on the surface of various cell types, in its active form, induces cells to produce and activate various metalloproteinases. Thus, we have tested the hypothesis that by affecting an upstream protein that regulates the activity of several metalloproteases, we can more effectively alter the detrimental roles of metalloproteinases in neuroinflammatory diseases of the CNS.

We have found that (MOG35-55) activated T-cells secrete high levels of EMMPRIN in its active form, suggesting that upon activation, T-cells are capable of producing active EMMPRIN. Immunofluorescence staining demonstrated higher numbers of EMMPRIN-positive cells in the CNS of EAE mice compared to healthy controls. Current experiments address which cellular population (CNS resident and/or inflammatory infiltrate) expresses EMMPRIN, and document the temporal changes of EMMPRIN levels in the CNS during the course of EAE disease. Furthermore, we will investigate EAE susceptibility and severity in EMMPRIN null mice versus wildtype controls. Finally, we have collected serum and CSF samples from human MS patients and healthy donors and will test if EMMPRIN levels are predictors of disease outcome. To the best of our knowledge this is the first investigation which targets an upstream MMP regulator in MS and EAE. The experiments should address whether targeting many metalloproteinases simultaneously with EMMPRIN in EAE and MS represents a reasonable therapeutic approach to managing the disease.

F-07

Multiple sclerosis and brain neoplasm: a report of two cases.

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Background: Patients with multiple sclerosis(MS) occasionally develop lesions on MRI which progress on serial neuroimaging. Such lesions may turn out to be tumefactive demyelination or brain neoplasm, thereby posing a diagnostic challenge. *Methods:* We present two cases of concurrent MS and brain neoplasm. Retrospective chart review was done for clinical details. Serial MRI scans were reviewed. Biopsies were analyzed by a neuropathlogist.

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The pertinent literature was reviewed. *Results:* Both patients with clinically definite MS had one "relatively large" 1.5cm lesion, amongst other typical lesions on initial MRI. First case presented with progressive right hemiparesis, 5 years after MS onset. MRI showed an expanding left frontal mass, in the location of the original lesion. Pathology of the partially resected mass was anaplastic ganglioglioma. The second patient had an initial MRI showing a 1.5 cm lesion but 6 years later this had progressed to an asymptomatic 5 cm mass on neuroimaging. The mass was partially resected and pathology showed an anaplastic oligoastrocytoma. Both patients were treated with combined temozolomide and radiotherapy. The MS clinical course of the patients remained unchanged. *Conclusions:* In MS patients, relatively large MRI lesions (1.5 cm or bigger) warrant close follow up with serial neuroimaging.

F-08

Three-year outcome of minocycline treatment in patients with Multiple Sclerosis

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Background: Current multiple sclerosis (MS) treatment is only partially effective, and not all patients respond well. This study was to evaluate safety, tolerability, and MRI impact of minocycline in relapsing-remitting (RR) MS. *Methods:* Ten patients were treated with minocycline. Three Tesla MRI was performed monthly during the 3 month run-in and first 6 months of treatment, then at 12, 24, and 36 months during a 30 month extension. Clinical assessments were completed at 3 month intervals until 6 months on treatment then at 6 month intervals. *Results:* Treatment was safe and well tolerated. The annualized relapse rate was 1.2 during the run-in and 0.25 during 3 years on treatment (p=NS). The proportion of active scans was significantly lower during the first 6 months of treatment (5.6%, p<0.001) and during the extension (8.7%, p= 0.002) than during the run-in (47.5%). T2 lesion volume decreased during treatment compared with baseline. The number of new black holes was lower at month 36 than at month 6 or 12. There was a continuous decline in annualized atrophy particularly during the third year (-0.37%). *Conclusions:* This trial suggests that minocycline is safe and potentially beneficial in RRMS and supports further investigation of its efficacy.

EPILEPSY AND EEG

G-01

Temporal and spatial attributes of high frequency oscillations in the pre-ictal period in humans

H Khosravani (Calgary), N Mehrotra (Calgary), M Rigby (Calgary), W Hader (Calgary), N Pillay (Calgary), S Wiebe (Calgary), P Federico (Calgary)*

Background: High frequency oscillations (HFOs) in EEG have been correlated with both physiological and epileptic brain activity. However, their spatial distribution and evolution over time are not well understood. We report on HFO changes leading up to seizures using commercial depth and grid electrodes. *Methods:* Intracranial EEG recordings (7 patients, 19 seizures) were obtained during seizure monitoring using commercial subdural or depth electrodes. EEG recordings were analyzed for frequency content and power analysis was performed in two ways: +/- 5sec. from seizure onset to identify key channels (localization), and for 30min. leading up to seizures (temporal). *Results:* Three observations were made: [1] HFOs (100-500Hz) can be recorded using commercial macro-electrodes. [2] HFOs were localized to channels of primary ictal onset and not adjacent contacts (100-200, 400-500 Hz p<0.05; 300-400 Hz p<0.001). [3] Temporal analysis of HFOs showed significant increases for 8 seconds prior to seizure onset in the 100-200 Hz band for onset channel but not adjacent contacts (p<0.05). *Conclusion:* Relatively large clusters of neurons may generate HFOs, as sampled by commercial macro-electrodes. HFOs are localized to the primary ictal zones and they show power increases in the pre-ictal period.

G-02

Gamma knife treatment for symptomatic epilepsy due to vascular malformations

F Moreau (Sherbrooke), C Deacon (Sherbrooke), K Brendan (Sherbrooke), M David (Sherbrooke)*

Background: Detailed prospective studies are scarce on gamma knife treatment for arteriovenous malformations (AVM) or cavernous angioma (CA) regarding epilepsy outcome. The objective of this study is to further investigate the time frame of gamma knife effect on seizures and expand our knowledge to other aspects of epilepsy management : medication, cognition and quality of life. *Methods:* All adult subjects submitted to gamma knife treatment for an AVM or CA based on a epilepsy indication and willing to participate in our center were included. The perilesionnal epileptogenic zone was defined with MRI, PET scan and scalp EEG. Seizure count and Engel score were recorded for the three months prior to intervention as well as baseline QOLIE-89 (quality of life score) and neuropsychological evaluation. Seizures and medication were recorded prospectively after treatment for two years. Neuropsychological evaluation was controlled at one year and QOLIE-89 was performed every year for two years. *Results:* Four patients with AVM and two with CA are included so far. Among the three patients with at least one year of follow-up, one is seizure-free, one has a significantly reduced seizure count and one encountered no changes. No significant adverse outcome has yet occurred. More data is expected by June 2007. *Conclusions:* New data on Gamma knife treatment for epilepsy due to AVM and CA will be useful to guide therapeutic decisions.

G-03

Self-reported Memory after temporal lobe surgery

SM Baz (London), R McLachlan (London), S Hayman-Abello (London), P Derry (London), A Alhousawi (London)*

Purpose: This study evaluates self-reported memory in patients after temporal lobectomy for intractable epilepsy. *Methods:* Adults who had a temporal lobectomy over a 5 year period with a minimum follow up of 1 year completed a questionnaire that included a validated 10-item memory self-efficacy scale (Frequency of Forgetting 10), the Centre for Epidemiology Studies Depression

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Scale (CES-D), and the Positive and Negative Affect Scale (PANAS) - a measure of the personality trait, neuroticism. The questionnaire was also given to age and sex matched controls without epilepsy. *Results:* Of 132 questionnaires, 78 (59%) were returned and 76 matched pairs were obtained. Mean age at surgery was 35 years (left/right temporal = 36/40) and mean postoperative follow-up was 5 years. Mean memory score of 46 was significantly worse in patients than controls (52, p=0.002). Memory after surgery was rated as worse by 30 patients (39%); 18 left temporal (50%) and 12 right temporal (30%) (p= 0.006). Perceived memory impairment correlated positively with both degree of depression (CES-D score, p<0.001) and the PANAS measure of neuroticism (p<0.001). *Conclusions:* Patients rated their post-surgical memory worse than controls. Depression, degree of neuroticism and surgery, particularly on the left, but not seizure control impact patient perception of memory impairment.

G-04

Reversible widespread leukoencephalopathic changes secondary to uncontrolled partial complex epilepsy

V Ciura (Calgary), C Toth (Calgary)*

Background: Frequent, uncontrolled seizures and status epilepticus have been associated with reversible changes detected with magnetic resonance imaging (MRI). *Methods:* We report the case of an elderly female patient with recurrent temporal lobe seizures presenting with aphasia and confusion. After discontinuing all medications, she was admitted to hospital in a delirious state, and was clinically suspected to have partial complex status epilepticus. MRI showed a new onset of widespread bihemispheric hyperintensities within white matter using T2 and FLAIR MRI imaging. *Results:* Within 24 hours of being restarted on anticonvulsants, the patient's clinical state improved, and she returned to her clinical baseline 72 hours later. Despite this clinical improvement, repeated neuroimaging again demonstrated marked leukoencephalopathic changes. Repeat MRI scans of the brain over the next 2 and 4 months demonstrated gradual improvement without resolution when compared to her previously identified neuroimaging baseline. *Conclusion:* Frequent epileptic seizures may lead to development of widespread MRI changes without rapid resolution. These changes may mimic neoplastic or inflammatory disease, and astute clinical recognition and repeat Neuroimaging may help confirm the relationship of such changes to epileptic events in selected patients

G-05

Reorganization of semantic noun processing in left temporal lobe epilepsy

J Edwards (Calgary), A Bass (Calgary), B Goodyear (Calgary), P Federico (Calgary)*

Background: Different semantic classes of nouns (e.g. concrete versus abstract) are normally processed in different cortical regions. We used functional MRI to determine whether patients with dominant hemisphere TLE show cortical representation of semantic information that is different than non-epileptic controls. *Methods:* Seven patients with left temporal TLE and hippocampal sclerosis were recruited. Ten age and gender-matched controls were also studied. All subjects were right-handed, native English speakers, and completed secondary school. Event-related fMRI was performed at 3T during a lexical decision task, involving semantic class stimuli manipulation (concrete versus abstract nouns). We performed a group analysis comparing fMRI activation patterns for concrete and abstract nouns. Subjects' reaction times in making the lexical decision were also recorded. *Results:* Patients' reaction times were significantly slower than controls for both stimuli ($p < 0.008$). Patients with left TLE showed significantly reduced superior and middle temporal gyrus activation compared to controls for abstract stimuli. In contrast, no significant differences were seen in the activation patterns for concrete stimuli. *Conclusion:* Patients with left TLE show interhemispheric reorganization for the processing of abstract semantic information. However, the patients' longer reaction times suggest that this reorganization does not completely compensate for normal language processing.

G-06

Modulation of fusiform face response by emotional facial expression

AO Hebb (Seattle), KJ Miller (Seattle), H Panagiotides (Seattle), JG Ojemann (Seattle)*

Introduction: The recognition of facial stimuli is important to social behaviour, particularly when interpreting emotional cues. The face-specific cortical negative-potential response at 200ms following stimulus presentation (N200) is reliably elicited within the occipitotemporal (fusiform) gyrus. To evaluate this cortical response with different emotional stimuli, neutral and fearful faces were presented to the ipsi-lateral or contra-lateral eye, relative to the electrocorticographic recording. *Methods:* Five patients undergoing long-term invasive electrocorticography with subdural surface electrodes for localization of seizure focus were enrolled in this study. Three different paradigms were used to localize and modulate the N200 facial response. Two of these paradigms used coloured glasses and overlapping coloured stimuli to provide a unilateral facial stimulus, with a non-face stimulus to the other eye. Neutral faces were alternated with fearful faces to evaluate the response to emotion. Electrode positions were calculated using 3-D reconstruction of a thin-slice CT scan with co-registration to a reconstructed pial brain surface. *Results:* The N200 face-specific response was observed in the sub-temporal region with facial stimuli. This response disappeared when the face was presented to the patient's non-dominant eye or when the facial image was back-masked with a distracting pattern. The presentation of fearful faces introduced an initial positive component at 100ms in addition to the classic N200. *Conclusions:* Our study confirmed that the cortical facial response requires specific attention, as presentation to the non-dominant eye and back-masking both extinguished the response. We had the novel discovery that fearful stimuli lead to an augmented early wave component at 100ms, suggesting that emotional content is processed in a fundamentally different way than non-emotional content, producing an early cortical change in addition to the classic phenomena seen with neutral facial recognition.

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G-07

T2 relaxometry and voxel-based statistics for MR imaging of epilepsy

RK Kosior (Calgary), ML Lauzon (Calgary), R Frayne (Calgary), P Federico (Calgary)*

Background: T2 is a magnetic resonance (MR) property of tissue. T2 relaxometry is a sensitive tool for detecting T2 abnormalities. The standard approach of drawing regions of interest (ROIs) for T2 relaxometry is subjective and restrictive in scope. A more recent approach termed voxel-based relaxometry (VBR) provides an unbiased statistical analysis of the entire brain. Our objective was to assess T2 abnormalities at the seizure focus and at distant sites using both approaches in an unselected group of patients with focal epilepsy. *Methods:* T2 maps were generated from a multi-echo MR acquisition performed on 40 consecutive epilepsy patients and 12 healthy control subjects at 3T. ROIs were placed in regions commonly assessed for T2 abnormalities. VBR analysis was performed using t-tests (p=0.05) between the control and patient groups. *Results:* Eight patients showed elevated T2 values in temporal lobe structures (>2 standard deviations from control means). T2 abnormalities were more conspicuous on the T2 maps than in the conventional MR acquisitions. VBR analysis showed expected abnormalities in individual patients. *Conclusions:* T2 relaxometry has high sensitivity in detecting abnormalities at the seizure focus. Initial VBR findings are promising, but reveal the need for more patient data grouped using sufficiently focused inclusion criteria.

G-08

Prevalence of non-convulsive status epilepticus in patients with impaired level of consciousness

RA Alroughani (Vancouver), M Javidan (Vancouver), N Al-Otaibi (Vancouver), A Qasem (Vancouver), H Chou (Vancouver)*

Background: Non-convulsive status epilepticus (NCSE) has been increasingly recognized as a cause of unresponsiveness in patients with impaired level of consciousness in the ICU setting. Recently published data estimated the prevalence to be between 3% and 8%. Objectives: To assess the prevalence of NCSE among patients with various degrees of impaired consciousness in Vancouver General Hospital. *Method:* We conducted a retrospective analysis of 451 adult (>15 years) patients with a question of NCSE or with an unknown cause of decreased level of consciousness between the years of 2002 and 2004. NCSE was defined according to Young's criteria of electrographic status epilepticus. NCSE was categorized into focal and generalized epileptic activity based on the long term EEG monitoring. Further analysis of age, gender and etiology was performed. *Results:* Of 451 patients, EEG demonstrated electrographic status epilepticus with no overt clinical signs in 42 patients (9.3%). Median age was 61.8 years (range 21-94). According to etiology, 38.1% of patients with NCSE had hypoxic-anoxic injury, 19% had intracerebral hemorrhage (including trauma), 11.9% had the diagnosis of idiopathic or cryptogenic epilepsy, 7.1% had ischemic stroke, 4.8% were secondary to tumors and 4.8% to viral encephalitis. 57.1% of the patients had focal electrographic seizures. *Conclusion:* EEG confirmed the diagnosis of NCSE in 9.3% of patients referred to our EEG laboratory. This is in keeping with the previous published data. This study indicates that EEG is a useful and cost-effective tool for the diagnosis of NCSE. The early diagnosis of NCSE could have significant impact on the outcome.

G-09

Anticonvulsant effects on functional MRI signal characteristics

G Mijne (Calgary), R Samji (Calgary), D Pittman (Calgary), E Jensen (Calgary), J Edwards (Calgary), B Goodyear (Calgary), P Federico (Calgary)*

Background: Functional MRI (fMRI) has been used to explore brain function in epileptic patients, most of whom take anticonvulsants. However, no studies have explored possible interactions between anticonvulsant exposure and the fMRI [blood oxygen level dependant (BOLD)] signal. We report preliminary results from our study into possible interactions between anticonvulsants and the BOLD signal. *Methods:* We recruited anticonvulsant naïve patients requiring carbamazepine, valproate, lamotrigine, or phenytoin for new onset seizures. Event-related fMRI was performed at 3T (GE Signa Excite) using a bilateral finger-tapping task prior to starting medication and eight weeks later. Serum anticonvulsant levels were measured prior to the second scanning session. We measured the following parameters for each study: mean activity (voxels x percent change in combined primary motor cortices: M1, M2), time to peak, onset time, and area under the BOLD response curve. Between-condition differences were determined by pairwise Student's t-tests. *Results:* To date, 21 patients have been recruited (9 carbamazepine, 5 phenytoin, 4 lamotrigine, 3 valproic acid). No measurable differences in all parameters were seen before and after starting anticonvulsants. *Conclusion:* These preliminary data suggest that carbamazepine, phenytoin, lamotrigine, and valproic acid may have no significant effect on BOLD fMRI signals measured in epileptic patients.

General Neurosurgery II

H-01

Fate of transplanted adult neural stem/progenitor cells in the injured adult rat spinal cord and impact on functional recovery

AM Parr (Toronto), I Kulbatski (Toronto), X Wang (Toronto), A Keating (Toronto), CH Tator (Toronto)*

Background: The purpose was to examine the survival and fate of adult rat spinal cord stem/progenitor cells (NSPCs) and bone marrow stromal cells (BMSCs) after transplantation into the injured adult rat spinal cord. Functional neurological recovery was also examined at 14 weeks. *Methods:* NSPCs and BMSCs were cultured from adult male rats expressing enhanced green fluorescent protein. NSPCs or BMSCs were transplanted after clip compression injury (35g force). Rats were sacrificed at 14 weeks after transplantation. Immunohistochemistry was used to identify cellular survival, fate, and division. Functional neurological recovery was also studied over a 14 week period. *Results:* NSPCs and BMSCs were easily identified and neither expressed markers of cell division. NSPCs differentiated into many oligodendrocytes and astrocytes, and no neurons. BMSCs exhibited better survival than the NSPCs, but did not differentiate

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into cells of neural lineage. No functional recovery was observed in either group, but the BMSCs significantly reduced the cavity size. Functional recovery was negatively correlated with astrocytic phenotype in the NSPC transplanted rats. *Conclusions:* Transplantation of spinal cord derived NSPCs result in cells of neural lineage, with astrocytes having a possible deleterious role. In contrast, BMSCs survive well, but do not become cells of neural lineage.

H-02

Comparison of section of filum terminale and non-neurosurgical management for urinary incontinence in patients with normal conus position.

P Steinbok (Vancouver), R Kariyattil (Vancouver), A MacNeily (Vancouver)*

Background: Patients with persistent urinary incontinence and a normal location of the conus on MRI may have occult tethered cord syndrome (OTCS).
Objectives: To compare outcomes in such patients after filum section versus non-operative treatment. *Material and Methods:* Retrospective analysis of consecutive series of children with refractory urinary incontinence and normal location of the conus, who were offered section of the filum for treatment of possible OTCS. *Results:* 9 children, 4.5 -11 years old, had filum section, with one child having 2 such operations. Clinical urological improvement occurred in 8 at mean follow-up of 25 months, with improved urodynamics in 5 of 6 tested postoperatively. Other non-urological back or lower limb abnormalities improved in 5 of 6 with such findings. No patient underwent additional urological operations after filum section. Six children, 5 - 13.5 years, including 5 with abnormal urodynamics, had no surgery for filum section. Other non-urological back and/or lower limb abnormalities were present in 4. At mean follow up of 17.5 months, only one patient had partial urological improvement and 3 patients had undergone bilateral ureteric reimplantations. *Conclusion:* Section of the filum in children with refractory urinary incontinence and OTCS may produce better urological outcomes than continued medical management.

H-03

Identification of the source of phosphatidylcholine for axon outgrowth and branching

JM Carter (Edmonton), RB Campenot (Edmonton), JE Vance (Edmonton), DE Vance (Edmonton)*

Background: During neuronal development and nerve regeneration following injury, axon growth greatly increases the demand for membrane. We previously showed that increased expression and activity of CTP: phosphocholine cytidylyltransferase β2 (CTβ2), a phosphatidylcholine biosynthetic enzyme, accompanies the growth of axons. [Carter *et al.* J. Biol. Chem. 278:44988]. *Methods:* Sympathetic neurons, retinal ganglion cells and differentiated PC12 cells were used to determine the sub-cellular localization of CTβ2 and elucidate (with RNA silencing) its role in axon growth and branching. *Results:* CTβ2 is abundant in axons of rat sympathetic neurons and retinal ganglion cells. Differentiating PC12 cells grow neurites which branch and later mature into axons. In CTβ2-silenced PC12 cells, the numbers of neurites and branches were sharply attenuated. Interestingly, the length of individual neurites was significantly increased so that the total amount of neuronal membrane was unchanged. In PC12 cells, the Akt inhibitor LY294002 promotes neurite branching; however, in CTβ2-deficient PC12 cells, LY294002 was unable to stimulate branching. CTβ2 was phosphorylated by cyclin-dependent kinase 5, a cell cycle protein implicated in axon elongation and regeneration after nerve injury. *Conclusions:* These results highlight the importance of CTβ2 in neurons for axon outgrowth and branching, and represent the first identification of a lipid biosynthetic enzyme that facilitates these functions in neurons.

H-04

Supraorbital keyhole approach via eyebrow incision for skull base lesions

S Stoika (Montreal), MW Bojanowski (Montreal)*

Background: Supraorbital craniotomy through a supraciliary incision, is an alternative to the pterional approach for skull base tumoral and vascular lesions. The technique is not yet standardized and limitations are not well defined. The purpose of this study is to present our initial experience. *Methods:* This series of twelve patients during one year period includes six sphenoidal meningiomas, 3 anterior circulation aneurysms, one craniopharyngioma, one intracerebral hematoma, and one CSF fistula. All patients were approached by a supraorbital craniotomy through an eyebrow skin incision. *Results:* Supraorbital keyhole approach allowed excellent exposure and exclusion of anterior circulation aneurysms. Complete removal of skull base meningioma was achieved in 5/6 cases (Simpson II), while a small residual lesion was left in one case. Two-stage procedure was required in one patient. Neurological and visual outcome were favorable in all patients. Post-operative discomfort was reduced compared to the pterional approach. *Conclusion:* The supraorbital keyhole approach allowed an excellent exposure for anterior circulation aneurysms and anterior and middle fossa skull base tumors. The craniotomy may be extended by an orbital rim/roof removal and opening of the supraorbital fissure. Post-operative discomfort is reduced compared to the pterional approach. Surgical strategies will be presented.

H-05

Chiari-syringomyelia complex and posterior fossa decompression : relationship between radiological and clinical improvement. A consecutive series of 34 cases.

HT Khuong (Quebec), A Turmel (Quebec)*

Background: Decompressive surgery for Chiari I malformation associated or not with syringomyelia has proven to be effective in improving clinical signs or radiological imaging. The purpose of this study is to review the effect of a posterior fossa decompression on radiological and clinical evolution and to explore the relationship between these results. *Methods:* Medical records and (MRI) scans were reviewed for 34 consecutive patients who underwent posterior fossa decompression, with or without duroplasty, for Chiari I malformation between 1999 and 2006. Measures of degree of tonsillar herniation, of syrinx size, and of cisternal occupancy were

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compared between preoperative and postoperative studies. A correlation of radiological improvement with clinical evolution was studied. *Results:* 34 patients underwent suboccipital craniotomy and C1 laminectomy: 6 of them also underwent a C2 laminectomy and 23 an augmentation duraplasty. Among patients with simple Chiari I malformation who had no duraplasty, 40% presented a reduced tonsillar herniation and 80% presented larger cisterns. Among these patients, we noted a 100% and 88% respective correlation with clinical improvement. Patients with simple Chiari I malformation and augmentation duraplasty showed an improvement rate of 80% and 60% for tonsillar herniation and cisternal occupance respectively. These rates correlated with a respective rate of clinical improvement of 50% and 67%. Among patients with Chiari I malformation and syringomyelia, the rates of tonsillar herniation improvement and cisternal occupancy improvement were 73% and 80%, correlating with clinical improvement for 64% and 58%. As for the syrinx, a reduced AP diameter was noted in 87% of cases, with clinical improvement in 62% of these cases. *Conclusion:* Among patients with simple Chiari I malformation, a reduced tonsillar herniation does not significantly correlate with clinical improvement. Patients with Chiari I malformation and syringomyelia show postoperative radiological improvement in most cases, but no tendency toward clinical improvement.

H-06 *K.G. McKenzie Memorial Prize Winner*
Basic Neurosciences

Enhancement of sensorimotor behavioural recovery in parkinsonian rats with a multitarget basal ganglia dopaminergic and GABAergic transplantation strategy

K Mukhida (Halifax), M Hong (Halifax), M McLeod (Halifax), G Miles (Halifax), N Kobayashi (Halifax), B Baghbaderani (Calgary), A Sen (Calgary), L Behie (Calgary), R Brownstone (Halifax), I Mendez (Halifax)*

Introduction: One current transplantation strategy for Parkinson's disease (PD) places fetal dopaminergic cells in the striatum (ST); however, this does not lead to complete functional recovery. An additional approach would be to transplant GABAergic cells to inhibit the subthalamic nucleus (STN) and substantia nigra (SN). This was explored using cells derived from either fetal rats or bioreactor-expanded human neural precursor cells (HNPCs). *Methods:* GABAergic cells (fetal rat or predifferentiated HNPCs) were transplanted into the STN and/or SN in conjunction with dopaminergic grafts of the ST in parkinsonian rats. Control animals received dopaminergic grafts alone or in conjunction with undifferentiated HNPCs in the SN and/or STN. Post-transplantation, graft function and viability were assessed electrophysiologically and immunohistochemically. *Results:* By 9 weeks post-transplantation, animals that received either fetal or HNPC GABAergic transplants showed significant improvement in akinesia and forelimb motor function compared to controls. Predifferentiated HNPCs maintained a GABAergic phenotype in vivo. Transplantation of fetal cells additionally resulted in improved electrophysiological outcomes. *Conclusions:* Restoration of dopaminergic activity to the ST in concert with inhibition of the STN and SN by GABAergic grafts enhances sensorimotor behavioural recovery in parkinsonian rats. This new approach may be beneficial in improving clinical outcomes in patients with PD.

H-07

Motor cortex stimulation for neuropathic pain: the British Columbia experience

H Low (Vancouver), CR Honey (Vancouver)*

Background: Neuropathic pain is one of the most difficult conditions to treat. Motor cortex stimulation (MCS) has been advocated as a treatment for this disorder. We present our experience in treating neuropathic pain with MCS. *Methods:* All patients who had undergone MCS in British Columbia were included. Inclusion criteria included screening by a chronic pain specialist, fulfilling the criteria for neuropathic pain, failed conventional treatment and the absence of significant psychiatric problems. The operation was performed according to a standardized protocol. Information was obtained from patient interviews, self-assessment questionnaires and a review of notes. *Results:* Six patients underwent MCS between 2004- 2006. The response was good-excellent in three patients, moderate in one and poor in two. Good responders exhibited two features: a) their pain consisted mainly of a constant, dull aching sensation as opposed to an unpleasant 'tight', stretching sensation and b) post-surgical testing elicited twitching or tightness in the affected body part. Pain location did not affect outcome. *Conclusions:* MCS was effective in 66% of patients with refractory neuropathic pain. Unique surgical techniques and patient selection will be highlighted.

H-08

Adjunctive use of a non-ionic surfactant improves fetal dopaminergic cell survival and reinnervation in a neural transplantation strategy for Parkinson's disease

M Quinn (Halifax), K Mukhida (Halifax), D Sadi (Halifax), M Hong (Halifax), I Mendez (Halifax)*

Introduction: Although neural transplantation of fetal dopaminergic cells is a promising therapy for Parkinson's disease (PD), poor transplanted cell survival limits its widespread clinical application. It was hypothesized that the use of poloxamer 188 (P188), a non-ionic surfactant, during cell preparation and transplantation may protect cells from associated mechanical injury and thus improve transplanted cell survival in a rat model of PD. *Methods:* Fetal rat dopaminergic tissue was dissociated in media with or without P188 and then cultured for one week or transplanted into the striatum of rats with unilateral 6-hydroxydopamine lesions of the nigrostriatal dopaminergic pathway. Fetal dopaminergic cell survival and reinnervation of the host brain was examined using tyrosine-hydroxylase immunohistochemistry. *Results:* Incubation of fetal dopaminergic cells with P188 during tissue dissociation significantly increased the number of surviving tyrosine-hydroxylase immunoreactive cells in vitro. Furthermore, parkinsonian rats that received P188-exposed dopaminergic cells demonstrated significantly enhanced striatal reinnervation compared to rats that received non-P188 treated cells. *Conclusion:* P188 protects fetal dopaminergic cells from mechanical injury by increasing cell survival and enhances dopaminergic fibre outgrowth into the transplanted striatum. Use of P188 may thus be an important adjunct to improve the clinical efficacy of a neural transplantation strategy for Parkinson's disease.

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H-09

Neurosurgery patients' knowledge and feelings about the role of residents in their care: A qualitative case study

E Knifed (Toronto), J July (Toronto), M Bernstein (Toronto)*

Background: The role of residents in their surgery is not clearly explained to patients. We undertook a research study to explore the level of knowledge and anxiety of patients regarding residents' involvement in their surgery. *Methods:* Qualitative case study methodology was used. 30 face-to-face interviews were conducted with patients prior to elective neurosurgery. Interviews were transcribed and subjected to modified thematic analysis by 4 reviewers. *Results:* The majority of patients had post-secondary education, and there was substantial religious and ethnic diversity among them. Most underwent craniotomy for brain tumour. Seven themes arose: 1) the level of knowledge about residents is low; 2) the level of anxiety about residents is low; 3) it is desirable for patients to meet the residents prior to surgery; 4) residents' educational needs are understood and supported; 5) patients prefer a teaching hospital over non-teaching; 6) anxiety is not increased by the interview; 7) patients have trust in the system. *Conclusions:* Patients appear unaware of the role of residents in their surgical care but seem not to be anxious about it. Trust in the system helps patients go forward with risky surgery. Surgeons need to be more forthcoming with patients about the role of residents.

NEUROMUSCULAR

I-01 *Andre Barbeau Memorial Prize Winner - CNS*

The role of microglia in ALS

L Korngut (London), L Ang (London), M Strong (London)*

Microglia appear to play a significant role in the pathophysiology of amyotrophic lateral sclerosis (ALS) but whether they are primarily neuroprotective or toxic is unclear. We present a morphological description of microglia within the human spinal cord, in ALS patients, with comparison of clinically moderately (lumbar) and severely affected (cervical) regions.

Tissue blocks from four respiratory-onset ALS patients were retrieved and multiple 4 micron slices from cervical and lumbar regions were performed. Standard tissue stains were performed including HLA-DR3 immunostaining to identify microglia. Slides were reviewed to identify areas with surviving motor neurons. A standard circular 500 micron marker was placed around each neuron photomicrograph. HLA-DR3 staining cells, representing microglia, were counted and categorized in three grades; grade one: activated; grade two: primed/ramified; grade 3: highly activated/amoeboid.

A higher number of total activated microglia were present surrounding motor neurons within the cervical segment as compared to the lumbar in the anterior horns of ALS patients with respiratory-onset ALS. This finding was highly statistically significant (p=0.0034). No increase in the degree of microglial activation was observed. Differential involvement of microglia in clinically severely versus moderately affected human tissue was demonstrated. The significance of this finding and its relationship to the pathophysiology of ALS requires further investigation.

I-02

Adverse effects of intravenous immunoglobulin therapy in patients with neuromuscular diseases are limited and tolerable

J Nadeau (Calgary), A Bhibhatbhan (Calgary), D McDougall (Calgary), C Toth (Calgary)*

Background: It has been assumed that intravenous immunoglobulin (IVIG) therapy is safe and of limited toxicity. Knowledge regarding the prevalence of adverse effects of IVIG within a patient population at a tertiary neuromuscular clinic is limited. *Methods:* We performed a retrospective chart review for patients identified with a database at the University of Calgary Neuromuscular Clinic, spanning the years of 1988-2006. Patients with a diagnosis of an autoimmune or inflammatory neuromuscular condition were considered. All charts were reviewed for the use of IVIG, and the identification of possible adverse effects associated with its use. *Results:* The charts for over 350 patients were reviewed. IVIG was provided to approximately one-third of all patients identified. Adverse effects were common, with the most common adverse effects consisting of headache (32%), nausea (16%) and allergic reaction (9%). Instances of possible thromboembolism were rarely (3%) identified. Adverse effects were deemed intolerable in approximately 6% of patients, leading to discontinuation of therapy. *Conclusion:* In most neuromuscular patients requiring therapy with IVIG, adverse effects are uncommon but require vigilance on the part of the treating physician. The most feared complication of IVIG therapy, thromboembolism, is a rare occurrence.

I-03

Adverse effects of acute and chronic corticosteroid therapy in patients with neuromuscular diseases are common and require greater prophylaxis

D McDougall (Calgary), A Bhibhatbhan (Calgary), J Nadeau (Calgary), C Toth (Calgary)*

Background: Corticosteroid therapy is known to have long-term toxicity. Prophylaxis of its complications, in some cases, is possible, however. Although corticosteroid complications are well known in non-neurological patient populations, knowledge regarding the adverse effects of corticosteroids within a neuromuscular patient population is limited. *Methods:* We performed a retrospective chart review for patients identified within a database at the University of Calgary Neuromuscular Clinic, spanning the years of 1988-2006. All patients with a diagnosis of an autoimmune or inflammatory neuromuscular condition were considered. Each chart was reviewed for the therapeutic use of corticosteroids, and the possible adverse effects associated with their use were recorded. Proper identification and prophylaxis for known complications was also assessed. *Results:* The charts for over 350 patients were reviewed. Corticosteroids were provided to approximately 50% of all patients identified. Adverse effects were common, ranging from the acute effects of insomnia and mood changes to more chronic adverse effects consisting of diabetes, hypertension, weight gain, osteoporosis, and cataracts. Proper prophylaxis and screening for conditions such as diabetes and osteoporosis, however, was infrequent. Adverse effects were deemed intolerable in approximately 5% of patients, leading to discontinuation of therapy. *Conclusion:* Corticosteroids are

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frequently used in many patients with neuromuscular disorders, and adverse effects, understandably, occur in a high percentage of this patient population. Until better therapeutic options are available, greater identification of necessary prophylaxis and occurrence of cortcosteroid-induced complications is of crucial importance.

I-04

Examination of congenital DM1 from the US National Registry for Myotonic Dystrophy

P Prendergast (London), S Magalhaes (London), C Campbell (London)*

Introduction: Congenital Myotonic Dystrophy (CDM) is associated with neonatal symptoms, developmental problems and chronic multi-system medical morbidities. Literature on CDM is limited as it is difficult for single centres to attain large sample sizes and there are few regional registries which would provide the potential for more powerful studies. The goal of this study is to describe CDM subjects enrolled in a national passive surveillance registry and to determine the feasibility of using this sample for other studies. *Methods:* Cases of CDM were identified from the US National Registry for Myotonic Dystrophy, maintained by Rochester University, since 2002. A case was defined as having a confirmed DM1 diagnosis and disease-specific symptoms in the first four weeks of life. Patients and physicians complete survey information on diagnosis, symptoms, treatments, assistive devices, morbidity and mortality at baseline and annually. Physician reports were used as the most valid source of data. *Results:* Twenty-one cases met inclusion criteria. Ten cases were recruited through the internet. The 13 male and eight female cases ranged in age from 3-24 years at the time of registration. In almost all cases self-report and physician reports were consistent, but in three situations only the physician report identified neonatal symptoms, which was principally hypotonia. The diagnosis was made prior to one year of age in eighteen cases with trinucleotide repeat numbers ranging from 940-2100. Gastro-intestinal, pneumonia and cardiac morbidities were most common. No deaths were noted. *Conclusion:* The US Registry is a valuable source of information on those with CDM and provides a potential population for further study. Although the database captures a wide range of CDM subjects, this sample appears to be a less severely affected group than those presented in existing case series.

I-05

A unique GJB1 gene mutation in X-linked hereditary motor sensory neuropathy

L Billinghurst (Edmonton), H Kolski (Edmonton)*

Background: Connexin 32 mutations are strongly implicated in Hereditary Motor Sensory Neuropathy, though remain incompletely understood. *Method:* Case report. *Results:* We report a family presenting with an X-linked pattern of hereditary motor sensory neuropathy. The proband is a 10 year old boy with clumsiness, pes cavus, foot drop, and learning difficulties. His nerve conduction studies showed borderline-slow conduction velocities though preserved amplitudes in both sensory and motor nerves. EMG was normal. His mother is mildly affected, though her twin brother has substantial difficulties with gait and hand dexterity. All affected members demonstrated the same c170A>C (Q57P) variation in the GJB1 (connexin 32) gene. This boy's brain MRI was normal, unlike others reported in the literature. *Conclusions:* This report expands the genotypic-phenotypic spectrum of X-linked Charcot-Marie-Tooth neuropathy.

I-06

National manpower survey on clinical neurophysiology laboratories in Canada

K Chan (Edmonton), S Warren (Edmonton), G Young (London)*

Background: No comprehensive data are available on clinical neurology manpower in Canada. This is needed for present and future planning. *Methods:* A questionnaire was mailed to all clinical neurophysiologists in Canada in March 2006; 2 follow-up mailings were sent to non-responders. *Results:* Of 428 individuals, 50% responded with characteristics likely representative of the whole group. There was wide provincial variation in manpower supply with a maximal >3 fold difference between provinces. Only 4% worked in rural settings. Most clinical neurophysiologists and technologists were >50 years. Over 40% of each would likely retire within the next 10 years. Wait time in >30% of EMG laboratories was over 10 weeks. *Conclusions:* There is major disparity in the supply of clinical neurophysiologists among different provinces and most work in urban centres. Many are in the older age groups and the majority of these clinical neurophysiologists and technologists will retire within the next 10 years. Already long waiting lists will likely be exacerbated as the manpower shortage becomes more severe.

I-07

Dyspnea and the use of non-invasive positive pressure ventilation in ALS

DC Todd (Hamilton), T Lad (Hamilton), DW Cockcroft (Saskatoon)*

Background: Dyspnea and respiratory muscle weakness in isolation is an uncommon presentation of amyotrophic lateral sclerosis (ALS). Non-invasive positive pressure ventilation (NIPPV) improves survival and decreases the rate of decline in lung function. It is uncertain whether lung function may improve in patients with ALS receiving NIPPV. *Methods:* We report the case of a patient with ALS who had a significant improvement in lung function following NIPPV therapy. A review of the literature to determine the prevalence of respiratory presentation in ALS and lung function improvement with NIPPV was performed. *Results:* A 62-year-old male presented with a three-month history of progressive orthopnea and longstanding radicular pain radiating to the left trapezius. While supine he developed dyspnea, tachypnea, and oxygen desaturation. Radiography confirmed bilateral diaphragmatic paralysis. Pulmonary function testing showed moderately severe restriction (total lung capacity 58% predicted) and moderate reduction in respiratory muscle strength. A diagnosis of ALS was confirmed electrophysiologically. The patient started bi-level NIPPV and riluzole. During two years of follow-up there has been a significant improvement in lung function despite progression of his neurological symptoms. A literature review identified 22 similar cases. There have been no reports describing improvement in lung function following NIPPV. *Conclusion:* Dyspnea or respiratory failure is an uncommon

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presenting manifestation of ALS. This is the first report to describe an objective improvement in lung function with NIPPV in a patient with ALS.

Pediatric Epilepsy

J-01

Selective Amygdalohippocampectomy in children versus adults: experience at the University of Alberta

A Datta (Edmonton), D Sinclair (Edmonton), M Wheatley (Edmonton), D Gross (Edmonton), S Ahmed (Edmonton)*

Background: The objective was to compare the results of the selective amygdalohippocampectomy (SAH) in children versus adults with refractory temporal lobe epilepsy. *Methods:* A retrospective case series was used. Patients underwent a SAH and had at least one year of follow up. Adults and children were divided into two groups. Patients' charts were reviewed and the data was compared between the groups. *Results:* 23 patients, 9 children and 14 adults were studied. Surgical outcome was variable between the two groups. Amongst the younger cohort, 3 patients (33%) were seizure-free (Engel Class I), 2 patients (22%) had rare seizures (Engel Class II), two patients (22%) had a worthwhile decrease in seizures (Engel class III) and two patients (22%) had refractory seizures that required a standard anterior temporal lobectomy. This differed from the adults, who all had a good outcome. Ten patients (71%) were seizure-free (Engel Class I) and the remainder (29%) had rare seizures (Engel Class II).

Non-MTS pathology was more common in children. *Conclusion:* Preliminary results show less favorable results in children with SAH. This may be related to the different pathology between the two groups. Adults most commonly have MTS, whereas children more commonly have non-MTS pathology. Clinicians should be aware of this difference when considering surgical management in children.

J-02

Is fever associated with both a family history and occurrence of febrile seizures?

KE Gordon (Halifax), JM Dooley (Halifax), EP Wood (Halifax), PP Bethune (Charlottetown)*

Objective: To reanalyze a dataset (AJDC 1993;147:35-39) to determine the relationship between a family history of febrile seizures and the magnitude, or presence of fever upon presentation to the emergency department. *Methods:* Seventy-five patients aged 6 months to 4 years presenting with a first febrile seizure were age matched to two febrile and two afebrile controls. The magnitude of fever was examined between the cases and febrile controls for family history of febrile seizures. The presence of fever was examined between the two control groups for family history of febrile seizures. *Results:* Children with incident febrile seizures had a higher temperature in the emergency department than febrile controls (39.3°C vs 39.0°C, p=.004). Febrile control children with a family history of febrile seizures had higher temperatures than those without (39.5°C vs 38.9°C, p=.04). An ANOVA model of the magnitude of fever within the febrile group (seizures and controls) suggested that this relationship was on the basis of family history status rather than seizure or control status, with a possibility of an interaction. Within the control children (febrile and afebrile), a family history of febrile seizures was associated with fever (OR 3.4, 95% CI: 1.1,10.7). *Conclusions:* A family history of febrile seizures appears to be associated with the magnitude of fever, and potentially, its presence.

J-03

Somatic comorbidity in children with epilepsy: a Canadian population health survey

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Background: Comorbidity in children with epilepsy has been explored infrequently in children with epilepsy in the general population. We assessed the prevalence of somatic comorbidity associated with epilepsy in children in the Canadian general population. *Method:* We analyzed data from the National Population Health Survey (NPHS) which contains data on a large population of children. The NPHS ascertained 49,000 respondents and used probabilistic sampling of the entire Canadian population. The prevalence of epilepsy was 5.2 (4.9-5.4). Eighteen chronic conditions were explored. These were ascertained through personal interviews. We obtained the prevalence ratio of chronic conditions in children with epilepsy versus children in the general population. *Results:* Three chronic conditions occurred significantly more frequently in children with epilepsy than in the general population (Risk ratio >2, 95% CI excluding the null value) ie., allergies, migraine and lung disease. Asthma was more frequent in children with epilepsy with a risk ratio >1. As expected, conditions of the elderly were absent in children with and without epilepsy (Alzheimer disease, cataracts and glaucoma). On the other hand, eleven conditions were present in children in the general population, but not in those with epilepsy, ie., arthritis, back problems, high blood pressure, diabetes, cancer, stomach, stroke, bowel disease and thyroid disease. *Conclusions:* The prevalence of allergies, migraine, asthma, and lung disease was significantly higher in children with epilepsy than the general population. This comorbidity pattern differs from that of adults with epilepsy. We discuss possible explanations for the low prevalence of certain chronic conditions in children with epilepsy, as compared to the general population.

J-04

Frontal lobe epilepsy surgery in childhood: outcome and critical analysis of reasons for lack of success

MB Connolly (Vancouver), L Langill (Vancouver), P Steinbok (Vancouver)*

Background: The objective of this report is to analyze outcome and reasons for poor success in children who underwent frontal lobe surgery for medically refractory epilepsy. *Methods:* Review of records of all children who underwent frontal lobe epilepsy surgery at BC Children's Hospital between Jan 1996 and Dec 2006. *Results:* Study population comprised 38 patients, median age at seizure onset 5 years (1 day-10 years) and median age at surgery 8.5 years (3 months - 17.5 years). Pre-surgical evaluation included invasive EEG monitoring in 13. High resolution MR imaging was normal in 11.

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Fourteen patients underwent more than one surgical procedure. The first surgical procedure was lesionectomy/cortical resection (n=37) and/or MSTs (n=2).
Mean follow-up was 4.8 years (0.2-10.5 years). Outcome following the first surgery, was good (Engel I or II) in 16. Following the second surgery, 26 patients (68%) were Engel I or II. Reasons for lack of success after initial surgery included: incomplete resection of lesion i.e. pathology more diffuse (13); epileptogenic zone involving eloquent cortex (9). *Conclusions:* Overall 68% of patients had an Engel class I and II outcome following frontal lobe surgery. Re-operation for additional resection improved the rate of positive outcomes and should be considered.

J-05

Iron Deficiency and Febrile Seizures in Children

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Background: Febrile seizures are the most common cause of convulsions in childhood. Iron deficiency is associated with a number of neurological disorders in children, but current data is indefinite regarding its association with febrile convulsions. *Objective:* In this study, we determined the association of iron deficiency with febrile seizures in a large cohort of children. *Design/Methods:* This study was a retrospective, case-control study. Patients who presented to the Stollery Childrens Hospital Emergency Department between January 2001 and May 2006, were between the ages of 6 and 36 months of age, and had a diagnosis of febrile seizure provided by a Pediatric ER specialist or Pediatric Neurologist, and who had a complete CBC done during their visit were included as cases. Controls were patients who presented with a febrile illness, but without seizures, were age matched, and also had a CBC completed. Excluded patients for both groups were those with developmental delay, CNS infection, a history of non-febrile seizures, chronic multi-system disease, or an underlying blood disorder. *Results:* A total of 1765 potential cases and 4092 potential controls were reviewed to attain the cohort of 361 cases and 390 controls. Reasons for exclusion included laboratory work not complete, data incomplete, or meeting exclusion criteria. The mean age of cases and controls were both 17.9 months. 59% of cases and 55% of controls were male. Patients with febrile seizure were almost twice as likely to be iron deficient compared with controls. The odds ratio for iron deficiency comparing cases and controls was 1.83 (95% confidence interval 0.98-3.50) and p=0.04. *Conclusions:* This study is the largest cohort of patients examining the relationship between iron deficiency and febrile seizures. Our results suggest that iron deficiency is a risk factor for febrile seizure in children 6 to 36 months of age. We recommend that screening for iron deficiency be completed in children presenting with febrile seizure.

J-06

Clinical and EEG features of cingulate epilepsy in children

DV Schrader (Vancouver), L Langille (Vancouver), A Singhal (Vancouver), P Steinbok (Vancouver), M Connolly (Vancouver)*

Background: Seizures from the cingulate gyrus are rare and are difficult to localize. The purpose of this study is to characterize the electroclinical features of proven cingulate epilepsy. *Methods:* Retrospective review of electroclinical findings and medical records. *Results:* The study group comprised four children with cingulate epilepsy, diagnosed on the basis of radiological and/or electrocorticographic findings. Seizure onset ranged from 1-7.5 years. Three patients described an aura: sensation of a supernumerary hand (1), dizziness (1) and cephalic feeling (1). A fearful expression and widening of the eyes at seizure onset occurred in two patients. One patient's seizures had a gelastic component and post-ictally he had panic and screaming. Complex automatisms were observed in two patients. Three patients had version of the head and eyes, and all had tonic stiffening. Two patients had flushing, pallor and tachycardia. Interictal scalp EEG recordings ranged from normal, to unilateral frontal, bifrontal or multifocal slowing and spikes. Ictal scalp recordings showed lateralized frontal, bifrontal or generalized changes. *Conclusion:* Seizures from the cingulate gyrus are characterized by autonomic symptoms, affective changes, elaborate automatisms, head and eye deviation, and tonic stiffening. Appreciation of this semiology could help localize the epileptogenic area when surgical management is being considered.

J-07

Physical activity in children/teens with epilepsy compared with that in their siblings without epilepsy

JS Wong (Edmonton), E Wirrell (Calgary)*

Background: To determine (a) if children and teens with epilepsy participate in less physical activity and have higher body mass index percentiles for age than their non-epileptic siblings and (b) what epilepsy-specific factors limit their participation. *Methods:* Patients 5-17 years, with a ≥3 month history of epilepsy, a development quotient ≥80, and at least one non-epileptic sibling in a similar age range were identified. Parents completed a questionnaire regarding sedentary activities and group, individual and total sports activities. Children aged 11-15 years completed the Health Behavior in School Aged Children questionnaire. Clinic charts were reviewed for seizure characteristics and number of anti-epileptic drugs ever taken. *Results:* Teens with epilepsy participated in less group and total sports activities than controls and were more likely to be potentially overweight or overweight. Receiving three or more AEDs in the past showed a significant negative correlation with sports participation. There was a trend for those with higher seizure frequency to be less active, but no other epilepsy specific factors or prior seizures or seizure-related injury during a sports event correlated with participation in physical activity. *Conclusions:* Programs that promote exercise in adolescents with epilepsy should be encouraged to improve their physical, psychological, and social well-being.

J-08

Outcome after Vagal Nerve Stimulation in Children with Intractable Epilepsy

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Objectives: Measurement of outcome after vagal nerve stimulation (VNS) for epilepsy differs across centers. We describe

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seizure outcome, neuropsychological functioning and quality of life after VNS using a standard protocol. *Methods:* Outcomes of children undergoing VNS for epilepsy with a minimum 2 year follow-up were reviewed. Patients followed a standard protocol with prospective data collection. Prior to implantation, neurological and neuropsychological assessments, including measurements of cognitive status, behavioural functioning, adaptive skills and quality of life, were completed. Assessments were repeated every 6 months post-implantation. *Results:* There were 36 patients, mean age 12 years (range 3-18), followed 3-6 years. Median duration of seizures was 9 years, with mean monthly seizure frequency of 150 (Range 6-1700). Seizure frequency decreased > 50% in 44% at 12 months, 25% at 36 months and 15% at 60 months. Adverse effects were minimal. Neuropsychological testing was achievable in 24 children. Significant improvements were noted in temporal orientation ($p < .03$), general orientation ($p < .03$), global QOL ($p < .05$), epilepsy-specific QOL ($p < .03$). There was no correlation between seizure and neuropsychological outcomes. *Conclusions:* VNS helped 44% of medically refractory patients with severe epilepsy at 1 year, but fewer after 1 year. Side-effects were minor.

Cerebrovascular Surgery and Interventional Approaches

K-01

Proposal for development of a Canadian Intracranial Aneurysm (CIA) Registry

J Spears (Toronto), L DaCosta (Toronto), B Gray (Toronto), R Macdonald (Toronto), T Marotta (Toronto), W Montanera (Toronto), M Tymianski (Toronto), M Wallace (Toronto)*

Background: The spectrum of intracranial aneurysms currently being treated by endovascular techniques go beyond the originally studied spectrum of aneurysms treated in ISAT. The goal of this proposal is to prospectively determine the incidence and identify predictors of radiographic and clinical events related to the treatment (endovascular and surgery) of intracranial aneurysms in the context of developing a Canadian Intracranial Aneurysm (CIA) registry. *Methods:* A prospective, multi-center cohort study identifying predictors of radiographic and clinical adverse events in the treatment of intracranial aneurysms will be conducted. Primary endpoints will include major aneurysm re-canalizations following endovascular treatment. Secondary endpoints will include the incidence of vasospasm, hydrocephalus, peri-aneurysmal edema and poor clinical outcomes (Rankin ≥ 3). A centralized internet-based registry will be established with all participating centers having complete access. All patients harboring untreated aneurysms will be recorded for future natural history studies. *Results:* Preliminary proposals for such a registry in the US have demonstrated significant enthusiasm regarding development of such a registry. Canada represents a health care system uniquely positioned to create such a registry from which such study of intracranial aneurysm treatment is easily feasible. *Conclusions:* Coordinated, multi-center study is not only feasible, but urgently needed to verify industry claims regarding the safety and efficacy of endovascular treatments (e.g. new generation coils) as well as the outcome of endovascular treatments as compared to surgery for more complex and elaborate aneurysms beyond those studied in ISAT.

K-02

Cerebrovascular reactivity changes predict neurological outcome after surgical revascularization for supraclinoid obliterative vasculopathy

T Kretschmer (Toronto), DJ Mikulis (Toronto), P Dirks (Toronto), L daCosta (Toronto), M Tymianski (Toronto)*

Background: Patients with progressive supraclinoid obliterative vasculopathy are at risk of cerebral infarction once their intracranial vascular autoregulation fails. Surgical revascularization is applied to prevent hemodynamic infarction in symptomatic patients with compromised cerebrovascular reactivity (CVR). Does bypass surgery induce objective CVR changes, and do potential changes correlate with neurological outcome? *Methods:* 19 symptomatic patients with angiographically confirmed supraclinoid obliterative vasculopathy and impaired CVR, underwent extracranial to intracranial bypass procedures. Following surgery, bypass patency was assessed by angiography, functional result by clinical exam and autoregulation by repeat CVR testing. To generate CVR maps a recently introduced noninvasive blood oxygen level-dependent magnetic resonance imaging-based method was applied during rapid manipulation of end-tidal PCO2. *Results:* CVR reactivity improved as early as 3 months postoperatively. Neurological symptomatology improved if CVR was restored. Chi square testing confirmed a relationship between the variables for postoperative CVR changes- and neurological-outcome ($\chi^2 = 21.207$, χ^2 P-value = .0118). Improved or stable neurological status was strongly related to restored CVR, as expressed by a Pearson's contingency coefficient of 0.726. *Conclusion:* Patients with supraclinoid obliterative vasculopathy benefit from successful direct and indirect revascularization procedures if CVR improves. Normalization of CVR correlates well with improved neurological status.

K-03

Multimodality treatment of posterior fossa arteriovenous malformations

ME Kelly (Cleveland), S John (Ottawa), R Guzman (Stanford), TE Bell-Stephens (Stanford), R Bower (Stanford), S Hamilton (Stanford), MP Marks (Stanford), HM Do (Stanford), GK Steinberg (Stanford)*

Object: Posterior fossa AVMs are relatively uncommon and often difficult to treat. *Methods:* Seventy-six posterior fossa AVMs were treated with radiosurgery, surgery and endovascular techniques. *Results:* Thirty-six patients had cerebellar AVMs, 33 had brainstem AVMs and 7 had combined cerebellar-brainstem AVMs. Mean follow-up was 4.0 years. Hemorrhage risk from presentation until initial treatment was 8.4%/year and 9.6%/year after treatment. The mean Glasgow Outcome Score after treatment was 4.1. Sixty-seven percent of patients had complete obliteration. 7/16 patients were cured with one radiosurgery treatment. 45/60 patients were cured with other treatments. Multivariate analysis showed radiosurgery alone to be a negative predictor of cure (p=0.044), but a positive predictor of excellent clinical outcome (p=0.022). Excellent presenting condition was a positive predictor of excellent clinical outcome (p=0.010). Spetzler-Martin grade I or II AVMs were more likely to be cured (p=0.011) and have excellent clinical outcomes (p=0.014). 13.2% of patients had major neurological complications from treatment. *Conclusions:* Single treatment radiosurgery has a low

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cure rate for posterior fossa AVMs. Multimodality therapy doubled this cure rate with excellent or good clinical outcomes in 84% of patients. Radiosurgery should be used for brainstem AVMs and multimodality treatment should be used for all other posterior fossa AVMs.

K-04

Expediting carotid endarterectomy via a rapid access neurovascular clinic

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Background: Meta-analyses of the trials of carotid endarterectomy (CEA) have highlighted the importance of rapid access to surgery after the presenting ischemic event. We have implemented a rapid access Neurovascular Clinic (NVC) to expedite the evaluation and treatment of patients with TIAs and minor strokes. We hypothesized that such a clinic would reduce event-to-surgery times. *Methods:* We reviewed the medical records of all patients who underwent CEA in our hospital during 2004 (after the implementation of the NVC) and compared the event-to-consultation, consultation-to-surgery, and event-to-surgery intervals to those for CEAs in 2003. *Results:* 64 CEAs were performed for symptomatic carotid stenosis in 2003 and 79 in 2004. The event date was not documented in 20% of cases in 2003 and 8% in 2004. Comparing 2003 to 2004, the median event-to-consultation interval was 54 vs. 29 days (p=0.29), consultation-to-surgery 13 vs. 11 days (p=0.24), and event-to-surgery 76 vs. 55 days (p=0.56). In 2004, of the 79 patients with symptomatic carotid stenosis, 27 were seen in NVC and 52 were not. The median event-to-surgery time was 27 days for NVC patients and 96 days for non-NVC patients (p=0.006). *Conclusions:* Ischemic event-to-CEA times are reduced by an organized approach to the evaluation of patients with TIA or minor stroke.

K-05

Wait times for carotid endarterectomy for symptomatic patients in community practice

ML Setiawan (Calgary), MD Hill (Calgary), JH Wong (Calgary)*

Background: Subgroup analyses from randomized trials have established the effectiveness of carotid endarterectomy (CEA) for moderate and severe stenosis within two weeks from randomization, with benefit decreasing over time. We wished to assess the timing of CEA for symptomatic carotid stenosis in our region and determine sources for delay. *Methods:* A five year (2001-2005) retrospective chart review was conducted of 95 symptomatic patients undergoing CEA by a single surgeon, with emphasis on examining timing of symptom onset, physician and specialist referral, and surgery. *Results:* Mean time from presentation of symptoms until surgery was 12 weeks, with those presenting in the community waiting 17 weeks and those presenting to hospital waiting 7 weeks. Only 29% underwent CEA within 2 weeks of symptoms. For initial carotid imaging, patients in hospital waited on average <1 week while those in the community waited 3.7 weeks. In addition, community patients waited 4 weeks on average for specialist or surgeon assessment. *Conclusions:* Symptomatic patients with carotid stenosis who present to hospital wait less for their radiological tests and surgery, compared to those investigated in the community. A significant proportion of patients do not receive expeditious treatment to maximize the full benefit of CEA to prevent stroke.

K-06

Revascularization surgery in moyamoya disease improves clinical disability and reduces the incidence of new TIA or stroke

R Guzman (Stanford), ME Kelly (Cleveland), T Bell-Stephens (Stanford), GK Steinberg (Stanford)*

Introduction: We present the consecutive series of patients with moyamoya disease treated at Stanford University by the senior author in the last 15 years. We evaluated the clinical outcome using the modified Rankin scale (MRS). Furthermore we analyzed the effectiveness of revascularization surgery to reduce the occurrence of transient ischemic attack (TIA) in the subgroup of patients presenting with TIA. *Methods:* The clinical records obtained in 207 patients undergoing 350 surgeries for moyamoya disease at Stanford University Medical Center between 1991 and 2006 were retrospectively reviewed. *Results:* There were 147 females and 60 males, the mean age at surgery was 29 years. We performed 296 direct and 54 indirect revascularization procedures. Mean follow-up time was 4.8 years (median 3 years). Presenting symptoms were stroke in 40%, TIA in 40%, intracerebral hemorrhage/ subarachnoid hemorrhage in 11%, headache in 13% and seizure in 6.3% of the patients. New neurological deficits in the first 30 days after surgery occurred in 3.9% of procedures (1.4% hemorrhagic (3/5 made complete recovery), 1.4% ischemic (4/5 made complete recovery), 1.4% transient/hyperperfusion). Three patients (1.4%) died in the first 30 days after surgery. Two patients had a large intracerebral hemorrhage one of which had a vein graft in 1994 and one patient who underwent omental-cerebral transposition suffered extensive scalp necrosis and died from subsequent infection and sepsis. Patients experienced a significant clinical improvement as measured by the MRS (pre-surgery 1.63 vs. 0.96 at follow-up, p<0.0001). 90% of the patients had a MRS 0-2 at a mean follow-up time of 4.8 years. Of the 84 patients presenting with TIA, 91.2% were TIA free at 1 year after surgery. *Conclusions:* We show in our series that revascularization procedures for moyamoya disease are safe, improve clinical disability and provide an effective means to reduce the occurrence of TIA.

K-07

Dynamic imaging of a model of saccular intracranial aneurysms using ultra-high resolution flat-panel volume CT

AP Mitha (Boston), B Reichardt (Boston), CS Ogilvy (Boston), R Gupta (Boston)*

Background: Although advances in MDCT have revolutionized the planning of aneurysm surgery, it has limited ability to show perforating vessels, blebs, and post-treatment neck remnants because of clip or coil artifact. In this study, we have used a model of saccular aneurysms to compare MDCT with the ultra-high resolution and dynamic scanning of experimental fpVCT. *Methods:* Ten New

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Zealand White rabbits were imaged pre- and post-clipping or coiling of surgically created aneurysms in the right carotid artery using fpVCT and MDCT. Images were reconstructed into 3D and dynamic views, which were evaluated for their ability to demonstrate clinically important features and for post-treatment clip and coil artifact. *Results:* FpVCT demonstrated aneurysm features with much higher resolution. Artifacts from clips and coils were significantly less than with MDCT, yielding useful information about neck remnants. Dynamic sequences revealed pulsating blebs and, in one case, clearly demonstrated an incidental finding of flow reversal through the vertebral artery. *Conclusion:* The spatial resolution and artifact profile of fpVCT is superior to MDCT and yields important anatomical information about the aneurysm dome and post-treatment neck remnants. Dynamic imaging capabilities allow for the observation of temporally evolving processes, such as pulsating blebs and flow redirection secondary to associated pathology or interventions.

K-08

Unruptured cerebral aneurysms presenting with ischemic events

N McLaughlin (Montreal), MW Bojanowski (Montreal)*

Background: Cerebral aneurysms rarely present with ischemic events. The goal of this study is to evaluate the outcome of these patients following aneurysmal treatment. *Methods:* Nine of the 166 consecutive patients treated between 2000-2005 for an unruptured aneurysm that presented with ischemic events were analyzed. *Results:* The aneurysm responsible of the ischemic event was located on the internal carotid artery (n=3), the middle cerebral artery (n=4), superior cerebellar artery (n=1) and the basilar artery (n=1). They measured 10mm or less (n=5); 11-20mm (n=2); more than 20mm (n=2). Four aneurysms were partially thrombosed on imagery. Three patients were treated endovascularly of which two had residual necks and one had a recurrent aneurysm. All required a second embolization. Five patients were treated surgically. Thrombosis of the aneurysm's parent vessel occurred in one and distal emboli in two, all associated with neurological deficits. Aneurysms were completely excluded in 4/5 operated patients. Unsuccessful endovascular treatment was attempted in one patient. All patients had a favorable outcome. *Conclusion:* Aneurysms presenting with ischemic events are often small and located on the anterior circulation. Although the risk of thromboembolic events following surgery is high in this series, the functional outcome is favorable.

K-09

Simvastatin causes endothelin-1-mediated vascular smooth muscle cell relaxation in a cellular-engineered model of cerebral vasospasm

AP Mitha (Cambridge), ER Balesh (Cambridge), RE Horton (Cambridge), ML McCain (Cambridge), ML O'Grady (Cambridge), KK Parker (Cambridge)*

Background: Simvastatin has recently been shown to reduce the incidence of vasospasm after subarachnoid hemorrhage. The mechanism underlying this effect, however, is not yet clear. We sought to determine how simvastatin affects endothelin-1-mediated vascular smooth muscle cell contraction in an *in vitro* cellular-engineered model of cerebral vasospasm. *Methods:* Rat aortic smooth muscle cells were micropatterned on 20 x 20 micrometer lines. Endothelin-1 was used to stimulate contraction of cells with and without simvastatin pre-treatment. Nuclear aspect ratio (short to long axis) was used as a measure of cell contraction. *Results:* Endothelin-1 alone caused an increase in aspect ratio (contraction) within 1-2 minutes (early phase) followed by a lower level increase over 30 minutes (late phase). Pre-treatment with a single dose of simvastatin for 24 hours attenuated the endothelin-1-mediated effect in the early phase and caused a prolonged decrease in aspect ratio below baseline levels (relaxation) in the late phase. *Conclusion:* Simvastatin results in reduction of endothelin-1-mediated contraction of smooth muscle cells in the early phase. In the late phase, simvastatin actually causes an endothelin-1-mediated relaxation of cells, which has not been reported before. This effect may be partly responsible for its clinical benefit in cerebral vasospasm after subarachnoid hemorrhage.

A high association between vertebrobasilar dolichoectasia and leukoariosis suggests that there may be a shared pathophysiology between these two diseases which warrants further explanation.

SPINE

L-01

Is age a key determinant of neurological outcome following traumatic spinal cord injury? Analysis of the Second National Acute Spinal Cord Injury Study (NASCIS 2) database

JC Furlan (Toronto), MG Fehlings (Toronto), MB Bracken (New Haven)*

Introduction: Given the rising incidence of spinal cord injury (SCI) in the elderly, we sought to examine whether age is a key determinant of neurological outcome following acute traumatic SCI. *Methods:* We included all patients who were enrolled in the NASCIS2. This study population was divided into: (i) placebo group; (ii) methypredinosolone group; and (iii) naloxone group. Neurological outcome was assessed at 6 weeks, 6 months and 1 year post-SCI using NASCIS motor and sensory score. Additionally, change in pain score was determined from baseline to 6 weeks, 6 months and 1 year post-SCI. Data analysis was performed using Chi-square test, ANOVA and multiple linear regression. *Results:* There were 171 patients in placebo group (145M, 26F; ages 13-89 years; mean=33.1), 162 patients in methypredinosolone group (140M, 22F; ages 13-88 years; mean=33.9), and 154 patients in naloxone group (124M, 30F, ages 14-86 years; mean=31.6). All groups were comparable regarding age, sex, ethnicity, weight, height, GCS, cause, level and severity of SCI. In all 9 linear regression models that were tested, age was not found to be significantly associated with NASCIS score after controlling for the baseline NASCIS score. Similarly, age was not significantly correlated with change in NASCIS pain score in the 9 models. *Conclusions:* Age at time of injury was not significantly correlated with neurological recovery or with pain control post-SCI. Given this, we advocate individualizing treatment approaches for elderly patients with SCI, as the opportunity exists for neurological recovery in this patient group.

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L-02

Motoneuron cell death is not responsible for the impaired nerve regeneration after chronic and sequential nerve injury

R Midha (Calgary), Q Xu (Calgary), J Forden (Calgary), T Gordon (Edmonton)*

Objective: We hypothesized that motoneuron cell death may partially underlie the poor outcome associated with surgical repair of nerves. *Methods:* Thirty rats underwent bilateral surgeries. The right side served at the control for motoneuron counts for retrograde labeling with Fast-Blue (FB). The left side served as the experimental side for chronic (upto 14 weeks) and sequential (0 and 8 weeks) nerve injury. On the left side, the femoral motor nerve was severed and either capped or repaired. After 8 weeks, the left side underwent re-exploration and FB labeling (n=12) and then motoneuron counts. In the remaining 18 rats, the femoral nerve was recut (sequential injury), exposed to FB, then re-repaired. Following another 6 weeks, Fluoro-Gold was introduced well distally to the repair site nerve to enable counting of regenerating motoneurons. *Results:* A mean number of 392, 350 and 390 (no SD) FB labeled motoneurons were counted from the right control side and the left injured sides, at 8 and 14 weeks, respectively. However, only 50% (mean 180 of double labeled neurons) of the motoneurons were capable of exhibiting a regenerative response. *Conclusion:* All motoneurons survive but only 50% regenerate after chronic and or sequential nerve injury in adults.

L-03

Transient SSEP change can detect iatrogenic spinal cord injury during spine surgery

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Background: Persistent SSEP deterioration during spine surgery is associated with iatrogenic spinal cord injury (SCI), but the significance of SSEP deterioration that recovers before the end of surgery has not been elucidated. *Methods:* Ulnar and tibial nerve SSEPs were performed bilaterally. A >50% decrease in amplitude of the cortical evoked potential following stimulation of any limb was considered "significant". A "transient" significant change was one that recovered before the end of surgery, while one that did not recover was considered "permanent". Pre- and postoperative neurological examinations were performed just before and after surgery. *Results:* Three hundred and thirty-five patients undergoing anterior cervical decompression and fusion (ACDF) were monitored. Twenty-nine (8.7%) had transient SSEP changes. One of those suffered iatrogenic SCI and another had a nerve root injury. Three patients (0.9%) had permanent SSEP change and two of those woke with iatrogenic SCI. The other had no new deficits (SSEP change was related to tourniquet placement). Three hundred and three patients (90.4%) had no SSEP change and none of those woke with new neurological deficits. Overall, transient SSEP change occurred in one of the three patients who suffered iatrogenic SCI. *Conclusion:* Transient intraoperative SSEP change should be considered an important event despite its lack of specificity.

L-04

Autologous activated macrophage implantation in a large animal model of spinal cord injury: motor recovery without axonal regeneration

R Assina (Phoenix), C Ma (Phoenix), T Sankar (Phoenix), KM Horn (Phoenix), N Theodore (Phoenix), AR Gibson (Phoenix), MC Preul (Phoenix)*

Background: Recovery from spinal cord injury (SCI) may be hindered by insufficient axonal regeneration secondary to a limited immune response. This limitation has been partially surmounted in small mammal models of SCI by autologous activated macrophage (AAM) implantation. We sought to replicate these results in a large animal. *Methods:* Six dogs were subjected to left T13 spinal cord hemisection. AAMs were implanted at both ends of the lesion site in 4 dogs. Two control dogs received sham cell media implantations. Motor recovery was assessed electrophysiologically with cortically-evoked hindlimb EMG and behaviorally with the Tarlov scale. After 9 months, animals were injected with wheat-germ horseradish peroxidase at L2 and sacrificed for histological assessment. *Results:* Three dogs treated with AAM showed significant EMG recovery ($p=0.008$). Behavioral assessment showed significant functional recovery in the treated group ($p<0.05$). Axonal retrograde tracer histology demonstrated minimal uptake in the ipsilateral red nucleus (0-1.4%) in both groups, with no local fiber crossing. *Conclusion:* We demonstrate electrophysiological and functional motor recovery from SCI in a large animal following AAM treatment. Paradoxically, we observed no axonal regeneration to account for observed recovery. Further investigation is necessary to determine the clinical feasibility and mechanisms underlying AAM therapy in SCI.

L-05

Reorganization of the primary motor and sensory cortices in patients with spinal cord compression: a pre and post-surgical evaluation using functional MRI

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Background: This prospective study characterizes the reorganization that may occur within the primary sensorimotor cortices following decompressive cervical spine surgery. *Methods:* Eleven right-handed patients with cervical myelopathy underwent blood oxygenation level-dependent functional magnetic resonance imaging (fMRI) prior to decompressive spine surgery and six months postoperatively. Ten right-handed controls also underwent fMRI. All subjects performed a finger-tapping paradigm with the right hand. Volume time course data was corrected for temporal serial correlation and %-normalized before inclusion in the general linear model. Group activation maps were created for each group with a threshold of $p<0.005$ with Bonferroni correction. Between group differences in left hemisphere volume of activation (VOA) were measured along the pre-central gyrus (PrCG) and post-central gyrus (PoCG). Each subject completed SF-36, neck disability index (NDI) and Japanese Orthopedic Association (JOA) questionnaires before each fMRI. *Results:* Preoperatively, patients demonstrated a larger VOA ($1234mm^3$, $t_{max}=11.8$) in comparison to controls within the PrCG. This difference increased following surgery ($2989mm^3$, $t_{max}=13.6$)

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Within the PoCG, controls demonstrated a larger VOA (528mm^3, t_{max}=8.28) compared to preoperative patients. This difference decreased postoperatively (124mm^3,t_{max}=7.05). Preoperatively, patients had a 21742mm^3 VOA (t_{max}=29.4) within the sensorimotor cortex with the centre of gravity located within Broadman Area (BA) 3. Following surgery, the VOA increased to 23093mm^3 (t_{max}=26.1) within BA 3. There were significant improvements in NDI (p=0.02) and JOA (p=0.01) scores following surgery. *Conclusions:* Spinal cord compression results in loss of VOA within the PoCG and increased volume of activation within the PrCG in comparison to healthy controls. Surgical decompression results in cortical reorganization with gain in VOA within both the PrCG and PoCG and improved functional status.

L-06

A prospective study to assess the reliability of a digital imaging-based assessment for cord compression and canal compromise after traumatic cervical spinal cord injury

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Background: The extents of maximum canal compromise (MCC) and maximum spinal cord compression (MSCC) are of clinical and prognostic value in the setting of traumatic cervical spinal cord injury (SCI). However, concerns remain regarding the accuracy of measurements based on hard copy images. In this prospective study, we hypothesized that the interobserver and intraobserver reliability of these assessments would be enhanced using magnified digitized DICOM images and software-based measurement tools. *Methods:* Measurements of midsagittal MRI and CT images of the cervical spine were undertaken on 5 cases with acute cervical SCI by 13 examiners on 10 separate occasions. *Results:* The intraobserver reliability for CT-MCC, T1-weighted-MRI-MCC and T2-weighted-MSCC was considered as moderate (interclass correlation coefficient [ICC] >0.4) in the 10 rounds for each case using ANOVA with post-hoc testing. In addition, the mean intraobserver ICC was 0.72±0.05 for the CT-MCC, 0.70±0.07 for the T1-weighted-MRI-MCC, and 0.68+/-0.11 for the T2-weighted-MRI-MSCC. The mean interobserver ICCs was 0.43±0.02 for the CT-MCC, 0.61±0.03 for the T1-weighted MRI-MCC, and 0.55±0.05 for the evaluation of T2-weighted MR-MSCC. *Conclusion:* The intra-observer and interobserver reliability for the MCC and MSCC measurements on CT and MRI were sufficiently high to support their use in the assessment of spinal cord compression and canal stenosis in patients with cervical SCI.

L-07

Kyphoplasty - expanding indications

R Sahjpaul (Vancouver), S Gul (North Vancouver), J Padilla (North Vancouver), J Clement (Vancouver)*

Background: Balloon kyphoplasty is an established method of treating osteoporotic and tumor-related vertebral compression fractures, and, as comfort with the procedure increases, the indications are also expanding. Previously accepted contraindications for the procedure, such as posterior vertebral body (VB) cortex fracture and epidural tumor are being successfully challenged. *Methods:* We present 7 patients who underwent successful kyphoplasty despite the presence of traditionally accepted contraindications. *Results:* Of the 7 patients, 6 had posterior vertebral body cortex fractures with retropulsion of bone (resulting in mild canal compromise in 3 and moderate to severe compromise in 3), and 1 had epidural compressive tumor. Kyphoplasty was successfully performed in all 7 patients. There were no neurological complications. Cement extravasation occurred in 1 patient without clinical consequence. *Conclusions:* Kyphoplasty can be safely performed in patients with spinal cord/thecal sac compression from retropulsion of bone or tumor, providing appropriate steps are taken in positioning of the balloon and cement injection.

L-08

Posterolateral or transverse lumbar interbody fusion (PLIF or TLIF) procedure for degenerative lumbosacral disease via a minimally invasive approach: a retrospective comparative study

N Marcotte (Quebec City), M Lacroix* (Quebec City)*

Background: Posterolateral or transverse lumbar interbody fusion (PLIF or TLIF) is a common surgical procedure for degenerative lumbosacral disease. In the recent years, multiple systems were developed for the placement of pedicular devices by a minimally invasive, transcutaneous route. The avoidance of an extensive muscular dissection confers theoretical advantages of a minimally invasive surgical approach. *Methods:* This study is a retrospective analysis of surgical case series comparing the classical 'open' and the 'minimally invasive' pedicular device placement for patients treated at our institution between January 2003 and 2006 by one surgeon. Variables observed included: demographics, length of surgery, estimated blood loss, hospital stay, narcotic use, radiological quality of device placement, complications, estimated cost and outcome of patients with lumbar and lumbosacral fusion for degenerative disease of the spine at one or two segments *Results:* There were 15 opened and 17 minimally invasive surgical procedures. The two groups showed comparable demographics. The length of surgery was shorter in the conventional 'open' procedure. Estimated blood loss, length of hospitalization, narcotic use and estimated cost favored the minimally invasive approach. The radiological quality of device placement, complication rate and outcome were comparable in both groups. *Conclusion:* Posterolateral or transverse lumbar interbody fusion (PLIF or TLIF) for patients with degenerative disease of the lumbosacral spine at one or two segments using a minimally invasive technique is an acceptable alternative to the conventional open procedure.

L-09

Fusion protein of soluble TNF receptor II and a thermally responsive peptide for sustained drug delivery

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Introduction: Tumor necrosis factor alpha (TNFα) is a pro-inflammatory cytokine that may induce inflammatory histopathology of the dorsal root ganglion (DRG) following lumbar disc herniation. Soluble TNF receptor II (sTNFRII) competitively binds TNFα with

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clinical value for painful radiculopathy, and animal studies demonstrate it to attenuate functional and histological changes at the DRG. Bioactive peptides expressed with elastin-like polypeptides (ELP) fusion partners gain a thermally responsive domain that can aggregate at physiological temperatures. Over time, release of fusion protein from aggregated form may locally sustain drug activity while minimizing systemic toxicities. This study expressed sTNFRII fused to ELP and demonstrated bidomain functionality. *Methods and Results:* The ELP gene (VPGVG)60 was subcloned to the sTNFRII gene and expressed in E. coli. The sTNFRII domain was immunoreactive and exhibited specific, high-affinity binding to TNFα. Anti-TNFα bioactivity was shown in vitro by decreasing TNFα-induced microglial glutamate production. The fusion protein was environmentally sensitive, with observable aggregates formed upon heating to physiological temperature (~240 nm). Aggregates slowly disaggregated with depot release characterized by a time constant of 21h. *Conclusions:* An ELP-sTNFRII fusion protein may function as a thermally-induced drug depot to sustain anti-cytokine activity of agents delivered locally to the disc-nerve interface.

NEURO-ONCOLOGY

M-01

Purely endoscopic transethmoidal transphenoidal surgical approach for non-secreting macro-adenomas with suprasellar extension

N McLaughlin (Montreal), F Lavigne (Montreal), C Beauregard (Montreal), MW Bojanowski (Montreal)*

Background: Microsurgery has been the standard approach for pituitary tumors. Recently we have adopted the new trend of two-surgeons, four-hands technique popularized by Kassam and colleagues. The aim of this study is to review our initial experience. *Methods:* Retrospective study of consecutive patients operated for the first time between 2004-2006 for non-secreting macro-adenomas with suprasellar extension. All patients were operated by endoscopic transethmoidal transphenoidal approach. *Results:* This series includes 12 females and 20 males with a mean age of 54 years. Neuro-ophtalmologic examination revealed a visual deficit in 72% of patients. A cavernous sinus extension was documented in 50%. Pre- and post-operative endocrinologic evaluation was performed in all patients. Post-operatively, improvement of visual function was confirmed by neuro-ophtalmologic examination in 71%. Of the 10 patients that had post-operative DI, 6 were transient. CSF fistula required re-intervention in 2 patients. Post-operative imaging showed absence of residual tumor in 63% of patients without cavernous sinus involvement. *Conclusion:* Purely endoscopic approach for macro-adenomas with suprasellar extension enabled excellent tumor resection and decompression of the visual apparatus with minimal complications. Improvement of the results is expected with more experience given the better appreciation of the tumor and surrounding anatomy compared to the microsurgical technique.

M-02

Practice audit: prophylactic peri-operative antiepileptic drug administration in patients with newly diagnosed malignant gliomas

SH Lwu (Calgary), PA Forsyth (Calgary), JG Cairncross (Calgary), IF Parney (Calgary)*

Background: AAN practice parameters recommend that long-term prophylactic anti-epiletic drugs (AED) should not be routine in patients with newly diagnosed brain tumors. However, data from the Glioma Outcomes Project shows that 89% of newly diagnosed glioma patients received AED despite the fact that only 32% presented with seizures. We examined our own prophylactic peri-operative AED practice patterns in newly- diagnosed malignant glioma patients. *Methods:* A retrospective chart review for AED use, seizure incidence, and adverse effects in adult patients with newly diagnosed malignant gliomas undergoing surgery at the Foothills Medical Centre between January 2003 and December 2005 was performed. *Results:* Of 122 eligible patients, 35 (28%) presented with seizures and all received prophylactic AED. Eighty-seven (72%) did not present with seizures and 34 (39%) received prophylactic AED. Peri-operative (1 week post-operative) seizures occurred in 2 patients without seizure prophylaxis (4%) and in no patients receiving AED. One significant AED reaction (rash) occurred. One patient developed new, persistent slurred speech post-ictally. Twenty-two patients (65%) had prophylactic AED continued > 1 week post-op. *Conclusions:* Local AED practice patterns in malignant glioma patients do not correlate with published clinical practice guidelines. Seizure incidence was small and did not differ significantly with prophylactic AED.

M-03

A combined epigenetic and genetic genome-wide screen identifies SPINT2 as a novel tumour suppressor gene in medulloblastoma

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Background: Medulloblastomas (MB) are the most common pediatric nervous system malignancy. Known mutations account for only a subset of cases. We hypothesize that promoter methylation-mediated tumour suppressor gene (TSG) silencing contributes to MB pathogenesis - either alone, or in combination with genetic events such as loss of heterozygosity (LOH). Screening for genes silenced by methylation may pinpoint novel TSGs previously not described in MB. *Methods:* MB cell lines treated with the methylation inhibitor 5-aza 2'deoxycytidine were screened using Affymetrix HG U133 plus 2.0 cDNA expression arrays. Regions where methylation and LOH converged were identified by comparing expression array data with LOH data from Affymetrix single nucleotide polymorphism arrays. Candidate genes were further analyzed using quantitative real-time PCR, promoter bisulfite sequencing, and methylation-specific PCR in MB cell lines, primary human tumour samples, and normal adult and fetal cerebella. *Results: SPINT2* - an inhibitor of the HGF/cMET signaling pathway - was identified as a novel TSG silenced by methylation in MB. We confirmed methylation of *SPINT2* using bisulfite sequencing, and found aberrant methylation in 17/51

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primary tumours by methylation-specific PCR. *Conclusions: SPINT2* is a TSG not previously implicated in MB. Excess HGF/cMET signaling has only recently been implicated in MB pathogenesis. *SPINT2* silencing by abnormal promoter methylation may allow HGF/cMET signaling to go unchecked, contributing to MB tumorigenesis. Work directed at determining the functional significance of *SPINT2* silencing in vitro and in vivo is ongoing.

M-04

Immunotherapy with a synthetic peptide improves response to radiotherapy in a murine glioma model

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Background: Microglial activation is a promising immunologic approach to glioma treatment suited to combination with existing therapeutic modalities. We developed a novel peptide capable of activating human microglia in vitro. In this study, we assessed the efficacy of this peptide when combined with radiotherapy in a murine glioma model. *Methods:* Sixteen C57BL/6 mice underwent stereotactic intracranial implantation of 10^5 GL261 glioma cells. Four mice received cranial radiation (4Gy on day 12 and 14), 6 mice were treated subcutaneously on alternate days with peptide (1 nanomole per gram body weight) beginning day 14, and 6 mice received radiation plus peptide. Mean tumor diameter on MRI was identical in each group prior to treatment. Animals were followed with serial MRI and sacrificed when moribund. *Results:* Mean survival was significantly increased in the peptide plus radiation group (28 days) compared to the radiation (21 days) or peptide alone (22 days) groups ($p<0.04$). Increase in tumor size was also significantly reduced in the peptide plus radiation group ($p<0.05$). *Conclusions:* Preliminary in vivo data show that microglial activation, achieved by administering a novel peptide, improves response to radiation in a murine glioma model. These promising results warrant further animal studies and, ultimately, clinical trials.

M-05

Complications associated with frame-based stereotactic diagnostic brain biopsy: a 622 case single-surgeon series

PN Kongkham (Toronto), E Knifed (Toronto), M Bernstein (Toronto)*

Background: Frame-based stereotactic brain biopsy has played an important role in the management of patients with suspected neoplastic intracranial lesions over the last two decades. We reviewed the surgical experience of the senior author (M.B.) to determine the nature and frequency of complications associated with this procedure, whose use is rapidly declining. Data on each case were collected prospectively by the senior author. *Methods:* Records were reviewed for 709 patients undergoing frame-based stereotactic procedures from July 1983 to May 2006. Procedures for Ommaya reservoir placement, brachytherapy, stereotactic craniotomy flap localization, shunt placement, or treatment of previously-diagnosed intracranial cystic lesions were excluded, leaving 614 patients in whom a total of 622 procedures were performed for diagnostic purposes. Complication rates and their association with clinical variables were sought. *Results:* Morbidity and mortality rates were 6.9% (43/622) and 1.3% (8/622), respectively. The risk of symptomatic hemorrhage (ICH, SAH, IVH) was 4.8%. The risks of transient or permanent neurological deficits were 2.9% (18/622) and 1.5% (9/622), respectively. A pathologic diagnosis of Glioblastoma Multiforme (GBM) was associated with perioperative mortality ($p = 0.002$). *Conclusions:* Overall, complication rates were comparable with those in previous reports. The subgroup of patients with GBM may possess an elevated risk of mortality compared to other patients undergoing frame-based stereotactic brain biopsy.

M-06

Identification of a mutation of the transmembrane/cytoplasmic domain of the cation independant mannose 6-phosphate receptor (CI-M6PR) in gliomas. An evaluation of receptor expression and function

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Background: The CI-M6PR is an important mediator of normal embryologic development, intracellular trafficking of hydrolases, interactions with the extracellular matrix, and apoptosis induced by granzyme B released from cytotoxic T- lymphocytes. The receptor's role in GBM progression and evasion of immune responses has not previously been evaluated. *Methods:* We evaluated glioma cell lines and early explant cultures for surface CI-M6PR expression. We used GrB and antibodies to determine receptor expression and functional capacity. RT-PCR was utilized to evaluate the receptor transmembrane/cytoplasmic domain. *Results:* 1 of 6 glioma cell lines and 2 of 3 explant cultures displayed very high surface CI-M6PR expression. Explant GBM Ed189Bt, despite high receptor expression, did not internalize GrB and was impervious to GrB mediated apoptosis. We identified a mutation of the transmembrane/cytoplasmic domain of the receptor in Ed189Bt. *Conclusion:* Expression of the CI-M6PR in glioma cell lines and early GBM explants is variable. In Ed189Bt surface receptor accumulation correlated with failure to internalize GrB and complete resistance to GrB or CTL mediated killing. We identify for the first time in GBMs a mutation of the transmembrane/cytoplasmic domain of the CI-M6PR that is associated with membrane accumulation and functional failure allowing immune evasion and possibly contributing to mitogenesis and tumour progression.

M-07

Screening for CNS tumour therapy sensitivity using an ex vivo invasion assay

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Background: CNS tumour progression is dependent on the tumour's ability to invade and grow into surrounding tissue. In this study, brain tumour surgical samples were assessed while exposed to a panel of clinically relevant chemotherapies using an ex vivo invasion and growth model. The invasion and growth of representative tumour tissue fragments are hypothesized to be reflective of clinical response to therapy. *Methods:* Tissue specimens

placed into a collagen matrix were monitored for invasion in the presence of chemotherapies for 5 days post-surgery. All samples were preserved for further examination of tumour growth, invasion and viability. *Results:* 45 patient tumours were assessed. Each tumour displayed a unique invasion and response profile. 15 patients' tumours were not significantly sensitive to any therapy tested. 9 benign tumours did not invade significantly into the matrix. Of 20 malignant tumours, 6 responded to Docetaxal, 6 to Procarbazine, 15 to Vincristine and 5 to Temozolomide. Results will continue to be compared to patient response, time to recurrence and survival up to 2 years. *Conclusions:* Individual response to chemotherapy is highly variable both clinically and in our ex vivo assessment. Pre-screening responsiveness to chemotherapies could lead to more individualized and more effective treatment of brain tumours.

M-08

Normal human monocytes cultured with glioma cells resemble myeloid suppressor cells

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Purpose: Malignant glioma patients are immunosuppressed, yet gliomas are highly infiltrated by monocytes/macrophages. Immunosuppressive monocytes (myeloid suppressor cells or MSC) have been identified in other cancers and correlate with tumor burden. We hypothesized that glioma exposure would cause normal monocytes to assume a MSC-like phenotype and that MSCs would be increased in glioma patients. *Methods:* Human CD14+ monocytes were purified from peripheral blood and cultured with human glioma cell lines. Controls were cultured alone or with normal human astrocytes (NHA). After 48 hours, glioma-conditioned monocytes (GCM) were purified using magnetic beads. GCM cytokine and costimulatory molecule expression, phagocytic ability, and ability to induce apoptosis in activated lymphocytes were assessed. MSC frequency was assessed in glioma patients' blood and tumor specimens and in GCM in vitro. *Results:* GCM have reduced CD14 (but not CD11b) expression, increased immunosuppressive IL-10, TGF-b, and B7-H1 expression, decreased phagocytic ability (for both glioma cells and *E. coli* cell wall particles), and increased ability to induce apoptosis in activated lymphocytes, all of which are features of myeloid suppressor cells. Glioma patients have markedly increased circulating MSC's compared to normal donors and MSC precursors are increased in glioma-infiltrating monocytes in situ and glioma-conditioned monocytes in vitro. *Conclusions:* Normal human monocytes exposed to glioma cells in vitro assume an immunosuppressive phenotype similar to myeloid suppressor cells seen in other cancers. Importantly, MSCs and their precursors are increased in glioma patients. Further study is necessary to determine MSCs' role in glioma-mediated immunosuppression and the contributions of IL-10, TGF-b and B7-H1 to this.

M-09

Purely endoscopic transethmoidal transphenoidal approach for Cushing's disease

MW Bojanowski (Montreal), N McLaughlin (Montreal), C Beauregard (Montreal), F Lavigne (Montreal)*

Background: Transphenoidal surgery is the preferred modality for ACTH-secreting pituitary adenomas. The aim of this study is to review our initial experience with purely endoscopic transethmoidal transphenoidal approach for Cushing's disease. *Methods:* Retrospective study of consecutive patients operated for the first time between 2004-2006 for ACTH-secreting adenomas. All patients were operated by endoscopic transethmoidal transphenoidal approach. *Results:* This series of 16 patients includes 9 females and 7 males with a mean age of 39.7 years old. MRI revealed a macro-adenoma in 4 patients, a micro-adenoma in 9, and in 3 patients the tumor could not be visualized. Remission was documented in 12 of 16 patients (75%) with a mean follow-up of 10 months. Transient DI occurred in 6 patients. One patient with no visualized tumor on imagery required a reoperation for persistent hypercorticism. Three patients were operated for CSF fistula. *Conclusion:* In our series, purely endoscopic transphenoidal pituitary surgery resulted in an initial excellent rate of remission which is comparable to reported microsurgical studies. More studies with a longer follow-up are needed.

M-10

Recurrent low grade gliomas: prognosis and volumetric analysis of resection

AO Hebb (Seattle), DL Silbergeld (Seattle), RC Rostomily (Seattle)*

Introduction: Several prognostic factors for patients with low grade glioma have been identified that allow selection of adjuvant therapy at the time of initial presentation. Evaluation of surgical resection is typically analyzed in categories of biopsy only, subtotal resection, or gross total resection. Previous volumetric studies of low grade glioma resections relying on CT and early MRI images suggest that small residual tumor volumes before radiation therapy are associated with a better outcome. Despite this data, clinical decisions at the time of tumor recurrence are often based on clinical experience and evidence extrapolated from higher grade tumors. We review our series of patients with low grade gliomas to identify prognostic factors, including the volumetric assessment of tumor resection, to guide the selection of salvage therapies. *Methods:* Patients with an initial diagnosis of supra-tentorial low grade glioma treated at our institution were selected for review. Patient-specific, tumor-specific, and treatment-specific variables including age, time course of disease, clinical presentation, location, size and imaging characteristics of tumor, pathology review, treatment and outcome were entered in a database. Preoperative, postoperative and recurrent primary brain tumor volumes will be measured using 3D visualization software to determine their association with tumor recurrence and patient survival. *Results:* We have identified 353 patients at our institution with an initial low grade glioma diagnosis. Clinical and radiological variables related to prognosis at the time of tumor recurrence will be discussed. Volumetric analysis of residual tumor volumes at the initial surgery and recurrence will be presented. *Conclusions:* The choices of therapy for recurrent low grade gliomas include re-operation, chemotherapy, standard radiation therapy, or radiosurgery. To provide evidence for treatment selection, we review our patient population for clinical variables and provide a volumetric analysis of low grade tumor resection to predict outcome at the time of recurrence.

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Critical Care

N-01

EEG for Prognosis after cardiac arrest

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Background: In assessing neurological prognosis after cardiac arrest EEG reactivity has not been included with EEG classifications. We conducted a pilot study to assess the potential prognostic usefulness of EEG reactivity and classifications. *Methods:* Study group: consecutive adults in coma at least 1 day following cardiac arrest (CA) or after normothermia achieved following hypothermic therapy. Exclusions: brain death, those under continuous sedation. EEGs were classified as benign or malignant according to previously published criteria and graded for reactivity following stimuli. Outcomes were dichotomous: recovery of awareness or no recovery of awareness during hospitalization. *Results:* 26 patients, ranging from 28 to 87 years of age, met criteria. Of those with benign patterns 5 recovered consciousness and 1 did not; with malignant patterns 3 recovered and 17 did not (p =0.0044, Fisher's exact test; likelihood ratio 2.52). Of the 5 with reactivity, all recovered; of those with no reactivity 16 died and 5 lived (p=0.0038, Fisher's exact test; likelihood ratio 8.5). None of the 14 with suppression or generalized spikes (none showed reactivity) recovered. *Conclusions:* EEG reactivity after cardiac arrest is a relatively favorable EEG feature; generalized suppression or generalized epileptiform activity, without reactivity, are associated with lack of recovery of awareness.

N-02

Functional MRI and EEG in the comatose survivor of cardiac arrest

TE Gofton (London), GB Young (London), F Bihari (London), A Dencev (London), M Nicolle (London), DH Lee (London), MD Sharpe (London), SM Mirsattari (London)*

Background: Functional magnetic resonance imaging (fMRI) and electroencephalograpghy (EEG) assess cortical function. fMRI, which detects hemodynamic changes during cognitive tasks, remains investigational. This study compares the results of blood-oxygenation dependent (BOLD) fMRI in anoxic-ischemic encephalopathy (AIE) to EEG following cardiac arrest. *Methods:* Ten comatose survivors of cardiac arrest (GCS<8) underwent EEG and BOLD fMRI. Box-car designed flashing checkerboard visual paradigm and tactile somatosensory paradigm were used to assess BOLD activation in the region of interest (ROI). Clinical outcome was assessed using the Glasgow Outcome Scale (GOS) at 3 months. An association between fMRI and EEG results and outcome of GOS>3 was sought. *Results:* Cortical activation within the ROI (Brodman areas 17, 18, 19) following visual stimulation was 33% sensitive and 100% specific for GOS>3. Following somatosensory stimulation, ROI (Brodman areas 3,1,2,5,7) was 50% sensitive and 63% specific for GOS>3. With outcomes of GOS<3, there was always agreement between unfavourable EEG characteristics and lack of fMRI activation. Favourable EEG and GOS>3 were consistent with presence of fMRI activation in only 1 of 2 cases. *Conclusion:* In AIE that follows cardiac arrest, fMRI has low sensitivity but high specificity for predicting GOS>3 at 3 months. It may act as an adjunctive assessment of cortical function.

N-03

Effect of hyperthermia on outcome in patients with aneurismal subarachnoid hemorrhage

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Background: Fever in critically ill patients with aneurismal subarachnoid hemorrhage may potentiate the amount of ischemic damage. We explore any association of fever with: (1) overall neurologic outcome (Rankin score), (2) Hunt and Hess grade and neurologic outcome, and (3) Fisher grade. *Methods:* Retropective analysis of Neuro ICU patients at the Hamilton General Hospital was conducted (July 2003 - March 2006) by two collectors. Univariate analysis was used. *Results:* 34 of the 98 identified Neuro ICU patients with aneurismal bleed had fever spikes (greater than 38.5ºC) during first ten days of admission. No identifiable source was identified. They were difficult to control, often unresponsive to anti-pyretics and cooling. Fever was associated with poor neurologic outcome (p=0.05). Those with fever and high Hunt and Hess grade, as compared to those without fever and the same Hunt and Hess grade, have poorer neurologic outcome (p=0.05). Fisher grade is not significantly associated with fever spikes (p=0.11). *Discussion:* Critically ill aneurismal subarachnoid bleed patients with central fever during the first ten days of admission had poor neurologic outcome, with trend toward increased mortality. In febrile patients, a higher Hunt and Hess grade is associated with poorer neurologic outcome. However, the overall thickness of blood on imaging is not associated with the occurrence of central fever.

N-04

Factors influencing neurologic outcome in aneurysmal subarachnoid hemorrhage patients

BW Lo (Hamilton), D Jichici (Hamilton), L Thabane (Hamilton)*

Background: Aneurysmal subarachnoid hemorrhage patients develop physiologic derangements that adversely influence neurologic outcome. These variables have not been well characterized in the Neuro ICU patient population. *Methods:* A retrospective analysis of McMaster University Neuro ICU patients presenting with aneurismal bleed was conducted (July 2003 - March 2006). Two collectors extracted data and compared with that from Registry of Canadian Stroke Network. Several variables were collected. Univariate analysis (Fisher's exact test, Mann-Whitney U test) was used. *Results:* 98 aneurismal bleed patients were admitted to the McMaster Neuro ICU (July 2003 -March 2006). Mean age 54 (29-85). Distribution: a com (37), MCA (30), p com (22), basilar (7), supraclinoid ICA (7), PICA (6), SCA (4), pericallosal (3), paraophthalmic (3), vertebral (2) and superior hypophyseal (1). Multiple aneurysms: 14 patients. Statistically significant ($p < 0.05$) variables indicating trend toward Rankin outcome score of 4-6: Hunt and Hess, Fisher grade, central fever, raised troponins and EKG changes. Statistically non-significant variables: pulmonary edema, previous CAD, previous statin use and hyponatremia. *Discussion:* For aneurismal bleed patients, Hunt and Hess, Fisher grade, central fever, raised troponins and EKG changes predict trend toward poor neurologic outcome; while neurogenic pulmonary edema, previous CAD, previous statin use and hyponatremia do not predict this trend.

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N-05

The frequency and clinical impact of hyperglycemia after acute spinal cord injury: a controlled cohort study with molecular examination of human spinal cord tissue

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Background: This study examines the potential associations of hyperglycemia (>7mmol/L) within the first week post-trauma with (1) severity of injury, (2) cardiovascular dysfunction (3) use of methylprednisolone, and (4) neurological outcomes. *Methods:* A controlled cohort study included all consecutive patients with spinal trauma after excluding who had nephropathy, diabetes mellitus or GCS<15. Patients were classified into motor complete SCI (ASIA-A/B), incomplete SCI (ASIA-C/D) and ASIA-E (controls). Neurological improvement was defined by at least one-grade change in the ASIA score. The clinical data were supplemented by a molecular immunohistochemical examination of human spinal cord post-mortem tissue for myelin (LFB) and axonal (NF200) preservation. *Results:* The cohort included 11 controls (5F, 6M; age 18-75 years) and 21 SCI individuals (6F, 15M; age 17-83 years) of whom 71.4% showed hyperglycemia post-injury. Glycemia was significantly associated with the severity of SCI ($p<0.001$) and methylprednisolone use ($p=0.018$), but not with clinical neurological recovery or cardiovascular dysfunction. The molecular evaluation included 7 SCI individuals (2F, 5M; ages 31-82 years). There was a trend for an association between the extent of axonal and myelin degeneration, the extent of hyperglycemia post-injury ($p=0.069$). *Conclusions:* Hyperglycemia is common after SCI and is associated with the severity of injury and use of methylprednisolone. Although there were no associations between hyperglycemia and neurological recovery, the trend for an adverse impact of hyperglycemia post-SCI on axonal and myelin integrity should alert neurocritical case physicians to aggressively monitor and treat hyperglycemia post-SCI.

N-06

Continuous EEG-monitoring for sedation management in severe GBS - a report of two cases

M Savard (Quebec), EA AL Thenayan (London), MD Sharpe (London), L Norton (Ste-Catharines), GB Young (London)*

Background: Complete muscular palsy is a stressful state in Guillain-Barre syndrome (GBS). Continuous EEG (cEEG) is a convenient method to monitor the depth of drug-induced coma to ensure adequate sedation, using spectral edge frequency (SEF) to quantify EEG activity. It has the advantage of providing a clear sedation target to the nursing team, with raw EEG waveforms still available for the attending physician, and is mainly not influenced by muscle activity so that sedation is not increased inadvertently in a patient who is recovering. *Methods:* We report two patients with severe GBS managed with sedation aimed at a SEF level below 4 Hz (delta coma), using the DATEX bedside EEG module. *Results:* Both patients were locked in with severe GBS. Heavy sedation was given for an average of 16 days and both patients were completely amnesic for this period of time with no serious complications. SEF target was easily obtained and sustained by the bedside nurse. *Conclusions:* cEEG monitoring using SEF is an easy, available and clinically useful tool to manage sedation in severe GBS.

N-07

Detection of seizures in ICU by a 4-channel bedside system compared to standard EEG

M Savard (Quebec), EA AL Thenayan (London), MD Sharpe (London), L Norton (Ste-Catharines), GB Young (London)*

Background: Most of the seizures occurring in ICU are non convulsive and require EEG monitoring for diagnosis. Unfortunately, a standard EEG is not always available on a 24 hours basis. *Methods:* 51 patients admitted to the ICU with seizures or at high risk of developing seizures were recorded for at least 24 hours. Simultaneous EEG recordings were done with the 4-channel Datex EEG module using a sub-hairline montage and with the 18-channel XL-TEK EEG recording (considered the gold standard) using the international 10-20 electrode placement system. Both sets of recordings were analyzed by two blinded EEG interpreters to assess sensitivity and specificity of the Datex EEG module. Here we illustrate one of these cases, in order to show the appearance of the seizure on the Datex module compared to the XL-TEK recording. *Results:* Sensitivity of the Datex module for seizure detection was 73%, with a specificity of 97%. Generalized seizures were more easily recorded with the Datex module than were focal seizures, both showing the recognizable evolution pattern seen with the usual EEG system. *Conclusions:* A 4-channel module is a useful way to detect seizures in ICU when standard 18-channel EEG is not available.

N-08

The validity of predictors of poor neurological outcome following therapeutic hypothermia for cardiac arrest

EA AL Thenayan (London), M Savard (Quebec), L Norton (Ste-Catharines), M Sharpe (London), GB Young (London)*

Background: Several predictors of poor neurological outcome after cardiac arrest were proven to be valid. These studies preceded the therapeutic use of hypothermia, which might alter their validity. The objective of this study is to reassess the validity of these predictors in post cardiac arrest patients treated with hypothermia. *Methods:* Retrospective chart review of seventeen adults treated with hypothermia after cardiac arrest. *Results:* None of four patients without pupillary reactivity, three without corneal reflexes on day three or three patients with myoclonus status epilepticus recovered awareness. Two of nine patients with motor responses no better than extension at day three recovered motor responses only after six days post-arrest (one at 5 and one at 6 days post-rewarming) and regained awareness. None of the nine patients with malignant EEG recovered awareness but all with non-malignant patterns did. *Conclusions:* Loss of motor responses better than extension on day three were not prognostically reliable after induced hypothermia for comatose cardiac arrest survivors. Loss of pupillary and corneal reflexes on day three and development of myoclonus status epilepticus and malignant EEG patterns were associated with poor outcome, while non-malignant patterns were associated with recovery of awareness.

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POSTER PRESENTATIONS

CEREBROVASCULAR SURGERY AND INTERVENTIONAL APPROACHES

P-001

The effects of stenting and endothelial denudation on aneurysm and branch occlusion in experimental aneurysm models

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Background: Stents are increasingly used to treat intracranial aneurysms. We studied the effects of stenting and endothelial denudation on aneurysm and branch vessel occlusion. *Methods:* Bilateral external carotid vein pouch aneurysms were created proximal to the lingual artery origin in 8 dogs, scraping the aneurysmal endothelium on one side, then both arteries were stented. Angiography was performed at stenting and prior to sacrifice, at 10 days (n=2), 10 weeks (n=4) and 20 weeks (n=2). In 4 other dogs, a carotid bifurcation aneurysm was created, with the vein pouch denuded or not (n=2 each), followed by stenting. Angiography was performed at stenting and prior to sacrifice at 5 (n=2) and 10 weeks (n=2). Branch occlusion between initial and final angiograms was recorded. Aneurysm tissue filling was studied at pathology, with attention to neointima formation. *Results:* Seven of 8 stented and denuded lingual aneurysms were obliterated compared to 2 of 7 aneurysms treated by stented alone (P<0.04). No bifurcation aneurysm became obliterated, but the denuded aneurysms showed partial thrombosis. Of 68 stent-covered branches, 5 (7%) were occluded and 17 (27%) had altered angiographic flow. *Conclusion:* Stenting led to suboptimal results in the presence of intact endothelium. Endothelial denudation can promote aneurysm occlusion when combined with stenting.

P-002

Monitoring of intracranial aneurysms treated with "Neuroform" stent-assisted coiling using contrast-enhanced MR angiography

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Background: Studies have demonstrated the use of contrast-enhanced MR angiography (CEMRA) to follow up coiled intracranial aneurysms. No study has reported up CEMRA to follow up intracranial aneurysms treated with stent-assisted coiling. This study investigates feasibility of CEMRA to follow patients with aneurysms treated with stent-assisted coiling. *Methods:* A retrospective review of patients treated with stent-assisted coiling using Neuroform stent was performed. CEMRAs were reviewed by 2 experienced neurointerventionalists. The studies were assessed for quality, parent vessel patency with stent, obliteration of the coiled aneurysm. The quality of study, parent vessel status and aneurysm obliteration was categorized. *Results:* A total of 19 CEMRA and DSA studies in 18 patients were found. The quality of CEMRA studies were diagnostic in all patients, the majority were good quality. Technical quality of the CEMRA's: 18 (94.7%) studies were good and 1 (5.3%) was poor but diagnostic. Patency of the parent vessel by CEMRA: normal 1 (5.3%), apparent mild stenosis 12 (63.2%), and apparent moderate stenosis 4 (21.0%), and severe stenosis 2 (10.5%). Aneurysm obliteration: complete 5 (26.3%), neck filling 6 (31.6%), and aneurysm sac filling 8 (42.1%). Aneurysm obliteration by CEMRA: complete 8 (42.1%), neck filling 5 (26.3%) and aneurysm sac filling 6 (31.6%). Only one patient showed more filling of aneurysm sac than the conventional angiogram and did not require recoiling. Three patients showed less filling on CEMRA than conventional angiogram which could be due to on going thrombosis. *Conclusion:* CEMRA may show apparent narrowing of the parent vessel(s). This may be artifactual from the stent. In spite of this, most cases evaluated by CEMRA were felt to be diagnostic. CEMRA is a promising non-invasive method for following aneurysms treated with stent-assisted coiling.

P-003

Symptomatic superficial siderosis associated with an intracranial arteriovenous malformation

N McLaughlin (Montreal), MW Bojanowski (Montreal)*

Background: Superficial siderosis (SS) is a rare disorder resulting from subclinical recurrent bleeding into the subarachnoid spaces. Cerebral AVM have rarely been reported and factors rendering them susceptible to develop SS remain unknown. *Methods:* Case report and review of the literature *Results:* A 41-year-old man known for progressive sensorineural deafness and cerebellar ataxia, presented for partial motor seizures. Cerebral and spinal MRI showed a superficial hypointense rim along the pial surface of cortical gyri, sylvian fissures, cerebellum, brainstem, cranial nerves and spinal cord. Angiography revealed a small posterior superficial fronto-orbital AVM. During investigations urinary disturbances appeared. Resection of the AVM was performed removing the source of recurrent bleeding. Only 4 other cases of AVMs associated with SS have been reported and their characteristics have been reviewed. *Conclusion:* SS is rarely attributed to cerebral AVMs. Small AVMs in relation with large subarachnoid spaces or in proximity of the ventricular system seem more prone to develop superficial siderosis. Resection of the potential bleeding source may hold the greatest hope for stabilisation of this chronic illness and improvement of patients' symptomatology.

P-004

Ruptured cerebral aneurysm revealed by the presence of severe vasospasm

N McLaughlin (Montreal), MW Bojanowski (Montreal)*

Background: Numerous factors may contribute to occulting a vascular lesion on initial angiography including aneurysmal thrombosis, arterial dissection and vasospasm (VS). However, the

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presence of VS might also enable the identification of an aneurysm. *Methods:* Case report and review of the literature *Results:* A 40 year-old man presented with a sudden severe headache during sexual intercourse. Other than a high blood pressure on arrival, the physical examination was normal. CT showed a diffuse subarachnoid hemorrhage (SAH), with most of the blood located in pre-pontine cisterns and a slight intraventricular hemorrhage without secondary hydrocephalus. No vascular anomaly was revealed and no confounding factors were noted on the initial angiography. Since the clinical presentation and hemorrhage pattern on initial CT were highly suggestive of an aneurysm rupture, a repeat angiography was performed day 8 following SAH showing severe VS on both ACA and mild to moderate VS on MCA and posterior circulation. A small aneurysm was identified on the AcoA between severely spastic ACAs. The aneurysm was treated surgically. *Conclusion:* Angiography performed during the period most at risk of VS may favour the identification of the ruptured aneurysms.

P-005

Atherosclerotic occlusive disease influences prognosis of patients with aneurysmal subarachnoid hemorrhage

N McLaughlin (Montreal), MW Bojanowski (Montreal)*

Background: It has been proposed that the absence of chronic atherosclerotic changes on initial angiography may be a favorable outcome predictor. This study assesses the clinical evolution and functional outcome of patients with aneurysmal subarachnoid hemorrhage (SAH) and documented cerebrovascular atherosclerotic occclusive disease. *Methods:* Retrospective study of patients with aneurysmal SAH treated between 1990-2004. Ten patients were included, 6 treated surgically and 4 treated endovascularly. *Results:* On admission, 60% of patients were in good clinical grade (H&H 1-2); 30%, fair grade (H&H 3); 10%, poor grade (H&H 4). Initial CT showed a lacunar infarct in one patient and ESCA in two patients. Initial angiography revealed occlusion of the vertebral artery in one patient and of the internal carotid artery (ICA) in 4 patients. Moderate to severe stenosis of vertebral or ICA was noted in 1 and 7 patients respectively. Six patients developed an ischemic complication documented on post-operative CT of which one had an embolic distribution while others presented either watershed or vascular territories. One patient presented symptomatic vasospasm. Functional outcome was favorable in only 20%. *Conclusion:* Patients with aneurysmal SAH and cerebrovascular occlusive disease are at greater risk of developing ischemic complications. They have a higher unfavorable outcome.

P-006

Proximal anterior cerebral artery occlusion for the treatment of large and giant fusiform aneurysms: is bypass required?

M Labib (London), D Steven (London), SJ Peerless (Florida), CG Drake (London), S Lownie (London)*

Background: Fusiform anterior cerebral (ACA) aneurysms are rare. Most reports describe the need for bypass procedures to protect the distal ACA circulation. We evaluated the safety of proximal occlusion without adjunctive bypass. *Methods:* Eight cases of fusiform ACA aneurysms were treated at our institution from 1965-2006 (7 males, mean age 35 yr, 3 ruptured). Six aneurysms were giant and 2 were large, four involving the A2 segment while 4 arose from the distal A1. Clinical grade was categorized as excellent (modified Rankin Grade 0-1), good (Grade 2), poor (Grade 3-5), and dead. *Results:* Preoperatively, 3 patients had excellent, 2 had good, and 3 had poor clinical grades. The collateral circulation was evaluated with angiography, balloon occlusion tests, and electro-encephalography. Proximal occlusion was achieved by tourniquets in 3 cases and clips in 5 cases. Postoperative infarctions were detected in two patients (one in the caudate head and one in the deep internal capsule) and were related to perforator- rather than distal collateral-failure. Overall, three patients had an excellent, 3 had a good, and 2 had a poor outcome. *Conclusion:* Proximal occlusion without bypass was safe and effective, subject to careful evaluation of the distal collateral circulation.

P-007

Stent reconstruction of wide necked aneurysms across the circle of Willis

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Background: To describe a novel technique for single stent reconstruction of wide-necked aneurysms arising from the circle of Willis. *Methods:* Neuroform stents were placed across the basilar apex (right P1 to left P1) via the posterior communicating artery in two patients, across the left carotid terminus (left A1 to left M1) via the anterior communicating artery in two patients and across the anterior communicating artery (left A1 to right A1) in one patient to support stent supported coil embolization. *Results:* Five female patients underwent successful deployment of the Neuroform stent across the circle of Willis to support the subsequent coil embolization of a wide necked cerebral aneurysm. In two patients with subarachnoid hemorrhage initial dome coiling was performed for short term protection followed by stenting across the circle of Willis to support completion of coil embolization during a second session. None of the patients experienced any peri-procedural or delayed neurological complications. *Conclusions:* Stenting across the circle of Willis represents a novel adjuvant technique to support the coiling of selected wide-necked intracranial aneurysms. This technique is particularly useful for wide necked terminal aneurysms which incorporate both branches of a bifurcation in a configuration unfavorable for Y-stent reconstruction.

P-008

Assessment of brain aneurysms after endovascular coiling using high-resolution magnetic resonance angiography

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Objective: We wished to compare the ability of high-resolution magnetic resonance angiography (MRA) relative to invasive digital subtraction angiography (DSA), the current gold standard, for evaluating coiled brain aneurysms. *Methods:* Since 2003, we prospectively followed 37 patients with 42 coiled brain aneurysms using both 1.5T Gadolinium-enhanced MRA and biplanar DSA. Each study was independently scored for its ability to assess degree of

aneurysmal remnant (complete obliteration, residual neck, or residual aneurysm) and visualization of the parent vessel (excellent, fair, poor). *Results:* A total of 44 paired MRA-DSA tests were assessed (median 9 days between studies). Excellent correlation was found between DSA and MRA for assessing residual aneurysm, but not for visualizing the parent vessel (kappa 0.86 and 0.10, respectively). Paramagnetic artifact from the coils was minimal, and in some cases, MRA identified contrast permeation through the coils not revealed by DSA. An intravascular microstent typically impeded proper visualization of the parent vessel on MRA. *Conclusions:* Compared to DSA, MRA non-invasively and accurately delineates residual aneurysm necks and parent vessel patency (in the absence of a stent), and offers superior visualization of contrast filling within the coil mass. MRA may obviate the need for routine diagnostic DSA in select patients.

P-009

Hydrocephalus after coiling of a large unruptured intracranial aneurysm

N Chaudhary (Brampton), D Sarma (Hamilton), T Gunnarsson (Toronto), N Murty (Hamilton), P Klurfan (Hamilton)*

Introduction: The Hydrocoil Embolic System (HES) was designed with an expansible hydrogel in order to fill more of the aneurysm volume than standard platinum coils. There are concerns that the use of Hydrocoils may be related to development of chemical meningitis and hydrocephalus. *Method:* This is a case of a 48 year-old asymptomatic woman with a family history of intracranial aneurysms. After screening, DSA revealed a large basilar tip aneurysm measuring 1.6 x 1.2 cm in size. Coil embolization was performed successfully using hydrocoils. Complete occlusion of the aneurysm was achieved. *Results:* Two platinum 3D coils and eighteen Hydrocoils were used for packing. One month later, she reported occasional sharp headaches that progressed to unremitting. Cerebrospinal fluid (CSF) revealed mild chemical meningitis. Computed tomography (CT) of the head demonstrated communicating hydrocephalus. The hydrocephalus was treated successfully with a ventriculoperitoneal (VP) shunt. *Conclusion:* Treatment of large intracranial aneurysms remains a challenge. Due to the ability to expand, Hydrocoils have been found to be useful in such cases. However, hydrocephalus may appear after these treatments although the risk seems to be low. The mechanism is unclear but some theories describe thrombosis and inflammation leading to aseptic meningitis, and hydrocephalus.

P-010

Skin necrosis after Onyx embolization of a scalp AVM

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Introduction: Congenital scalp arteriovenous malformations (AVMs) are rare. They have been treated with NBCA (N-butyl-cyanoacrylate) in the past. Onyx (Onyx Liquid Embolic System, Micro Therapeutics, Irvine, California) is an ethylene vinyl alcohol co-polymer, which has recently become available for embolization. Skin necrosis has not been reported as a complication of its use. *Methods:* A 49 year-old woman with a recurrent forehead AVM previously resected. Embolization was performed successfully with complete occlusion of the AVM after the injection of a single feeding scalp vessel with 2 ml of Onyx. *Results:* Signs related to skin necrosis were seen a few days after the procedure including tenderness and wound discharge. Three weeks post embolization, a 2.0 x 1.5 cm elliptical necrotic skin area was noted at the location of the previously treated AVM. *Conclusion:* Skin necrosis has been previously reported in cases when the total arterial supply of a territory was affected. In this case the arterial supply to the forehead could have been reduced due to the previous surgery. The mechanism of the necrosis could be related to the ability of Onyx to occlude collateral flow to the region. Also angionecrosis has been described with the use of the dimethyl sulfoxide solvent.

P-011

Case cost analysis for patients undergoing surgical clipping and endovascular coiling of intracranial aneurysms at St. Michael's Hospital, University of Toronto

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Background: To determine the total inpatient cost and mean length of stay associated with surgical clipping and endovascular coiling of both ruptured and unruptured intracranial aneurysms at St. Michael's Hospital, University of Toronto. *Methods:* A retrospective cost analysis was performed based on a 6 month audit of all aneurysms treated between April and September 2006. Analyses included direct case costing and mean length of stay (mean LOS) averages. All calculations were based upon discharge abstract data. *Results:* Total average cost for admission and treatment of all aneurysms treated during the audit period was $48228 (clipping)/case and $32136 (coiling)/case. Mean length of stay durations were 24 days (clipping) and 14 days (coiling). *Conclusions:* A direct comparison between the mean case cost and mean LOS for patients undergoing clipping vs. coiling is cautioned as there is inherent selection bias in such an analysis, however, it appears that patients who undergo coiling of their aneurysm on average incur 66.7% the total cost as compared to surgical clipping. Similarly, a reduction of 42% (24 vs. 14 days) in mean LOS in favor of coiling is noted. Such audits do not include costs associated with post treatment surveillance imaging nor re-treatments and these factors should be considered in future complete cost analyses.

P-012

Efficiency and security of endovascular treatment for symptomatic carotid stenosis

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Carotid endarterectomy have been demonstrated by prospective studies to improve patient survival with both symptomatic and asymptomatic carotid artery stenosis.[1-4] Since these publications, endarterectomy became the reference procedure for the revascularisation of extracranial carotid stenosis. However, endarterectomy benefit is more mitigated among high operative risk patients.[10] With a general tendency to practice minimally invasive interventions, carotid angioplasty with or without stent device

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becomes an alternative to consider,[5-9] especially for several patients who doesn't meet the inclusion criteria of endarterectomy studies. Angioplasty often becomes the only therapeutic option for these patients with co morbidities or with surgically inaccessible lesions.[1,11,12]

To be considered an alternative to standard treatment, the endovascular procedure must be demonstrated as secure and efficient as surgery.

There are few endovascular studies and they are heterogeneous. They're not answering the clinical dilemma and not defining endovascular treatment place in therapeutic options. The goals of this retrospective study, including more than 160 procedures, are to determine medical and neurological morbidity as well as early mortality associated with carotid stenting procedures in symptomatic carotid stenosis. Other primary issues are to define immediate and medium-term efficiency by doppler quantification.

The preliminary morbidity and mortality results as well as immediate and medium term efficiency seem promising.

References

1. NASCET N Engl J Med. 1991;325:445
2. ECST Lancet. 1998;351:1379-87
3. ACAS JAMA. 1995;273:1421-8
4. ACST Lancet. 2004;363:1491-1502
5. CAVATAS Lancet. 2001;357:1729-37
6. Brooks et al. J Am Coll Cardiol. 2001;38:1589-95.
7. Brooks et al. Neurosurgery. 2004;54:318-24
8. Naylor et al.J Vasc Surg. 1998;28:326-34
9. Yadav et al.N Engl J Med. 2004;351:1493-501
10. Rothwell et al. Stroke. 1996;27:260-5
11. McCarthy et al. Carotid artery. Am J Surg. 1993;166:168-71
12. Borger et al. Ann Thorac Surg. 1999;68:14-21

DEMENTIA

P-013

Do haplogroups H and U act to increase the penetrance of Alzheimer's disease?

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Alzheimer's disease (AD) is the most common form of dementia in the elderly in which interplay between genes and the environment is supposed to be involved. Mitochondrial DNA (mtDNA) has the only noncoding regions at the displacement loop (D-loop) region that contains two hypervariable segments (HVS-I and HVS-II) with high polymorphism. mtDNA has already been fully sequenced and many subsequent publications have shown polymorphic sites, haplogroups, and haplotypes. Haplogroups could have important implications to understand the association between mutability of the mitochondrial genome and the disease. To assess the relationship between mtDNA haplogroup and AD, we sequenced the mtDNA HVS-I in 30 AD patients and 100 control subjects. We found that haplogroups H and U are significantly more abundant in AD patients (P =0.016 for haplogroup H and P =0.0003 for haplogroup U, thus,these two haplogroups might act synergistically to increase the penetrance of AD disease.

P-014

Efficacy of galantamine in patients with rapidly progressing Alzheimer's Disease

S Gauthier (Montreal), F Dunbar (Toronto), F Camacho (Toronto)*

Background: The rate of Alzheimer Disease progression varies. Those patients with initial rapid decline have a poorer prognosis. An analysis to determine the efficacy of galantamine in patients with rapid disease progression was undertaken. *Methods:* Data from open-label 26-week extension trials of two double-blind, placebo-controlled trials assessing galantamine treatment in subjects with mild to moderate Alzheimer's Disease were pooled. Patients randomized to placebo with ≥4 ADAS-cog points decline during the 26-week double-blind trials were defined as rapidly progressing, those with <4 points decline as slowly progressing. The efficacy of galantamine in these two groups during the extension trials was evaluated. Predictors for rapid progression were assessed. Analysis of covariance and logistic regression were used for the analyses. *Results:* ADAS-cog scores from 55 rapidly and 134 slowly progressing patients after 26 weeks open-label galantamine treatment were available. After adjusting for baseline differences (MMSE and ADAS-Cog), significantly greater cognitive benefit was found in the rapidly progressing group (26 weeks p-value < 0.0001). Duration of cognitive symptoms (p-value=0.0449) and MMSE (p-value=0.0255) were found to be significant factors in predicting rapid deterioration. *Conclusions:* Patients with rapid disease progression may have an even greater response to galantamine than those with slow progression.

P-015

Two cases of sporadic Creutzfelt Jacob disease, one with and the other without dementia at onset.

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A rapidly progressive cognitive decline, followed by focal neurological findings, and EEG findings of periodic sharp wave complexes are suggestive of a clinical diagnosis of sporadic Creutzfelt Jacob Disease (sCJD). The initial clinical presentation of sCJD can be vastly different from case to case and there is no distinct profile of cognitive change in CJD. Analysis of CSF for protein 14-3-3 and cranial imaging with MRI may aid in the diagnosis of CJD. However, a definitive diagnosis of sCJD can only be confirmed with histological evidence by biopsy or at autopsy. We will describe two cases of neuropathologically proven sCJD, who presented to hospital within weeks of one another with drastically different clinical presentations. The two patients were not biologically related, but both were from the same geographical region of Niagara. One was a 49 year-old male accountant, who presented with predominantly psychological symptoms of rapid memory and cognitive decline over a few weeks. The other was a 53 year-old female, who presented with neurological symptoms of ataxia, myoclonus, and motor weakness that increased in severity over several months. The two cases further illustrate that sCJD can have vastly different clinical presentations based on the onset of neurological and psychiatric symptoms despite

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involvement of the same CNS structures. An outline of the diagnostic challenges, as well as the nursing and psychosocial issues surrounding the supportive care of the two patients and their families will be provided.

Epilepsy and EEG

P-016

Somatic comorbidity in adolescents and adults with epilepsy in the general population

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Background: Epilepsy has substantial comorbidity with other chronic conditions. Few data exist on the prevalence of chronic health conditions associated with epilepsy by age group. We assessed the prevalence of somatic comorbidity associated with epilepsy in two age groups in a large Canadian population health survey. *Method:* We analyzed data from the Community Health Survey (N=130,882) which studied people older than 15 years. The survey used probabilistic sampling of the entire Canadian population and explored the presence of 19 common chronic conditions. These were ascertained through personal interviews. The prevalence of epilepsy according to the CHS was 5.6 (5.1-6.0). We compared the prevalence ratio of chronic conditions in people with epilepsy versus that in the general population in two age groups, 15-59 and >60 years. *Results:* In people with epilepsy including adolescents and adults (15-59) the following conditions had a prevalence ratio >1 and <2 ($p<0.05$) in people with epilepsy: allergies, asthma, arthritis, back problems, high blood pressure and migraine. The following conditions had a prevalence ratio >2 ($p<0.05$) lung disease, heart disease, stomach ulcers, stroke, urinary incontinence, bowel disorders, thyroid problems and chronic fatigue syndrome (CFS). In older adults with epilepsy (>60 years) the following conditions had a prevalence ratio >1 and <2 ($p<0.05$): asthma, back problems, migraine, heart disease, cancer, stomach ulcers, urinary incontinence, bowel disorders and glaucoma. The following conditions had a prevalence ratio >2 ($p<0.05$) lung disease, stroke, and CFS. *Conclusions:* The somatic comorbidity of people with epilepsy varies considerably according to age group. Every group of age has a unique comorbidity profile which is related with the comorbidity pattern of the general population. We discuss methodological issues and validity of findings.

P-017

The EEG correlates of cerebellar fits

Y Nadeau (Quebec), R Desbiens (Quebec)*

Background: Cerebellar fits, caused by tonsillar herniation or Chiari malformation, have been observed and described for more than a century. Their manifestations include alteration of consciousness and extensor posturing that can mimic epileptic seizures. Conversely, the literature on electroencephalographic changes occurring during these episodes is scarce. *Methods:* We report a 24-year-old woman with Chiari I malformation and ventriculoperitoneal shunt for hydrocephaly who presented with headache, nausea and vomiting, paroxystic decerebration-like posturing and alteration of consciousness. One such event occurred during an EEG recording. The episodes, diagnosed as cerebellar fits, disappeared completely after shunt revision. Antiepileptic medications were stopped and attacks never recurred during a three-year follow-up. *Results:* During cerebellar fits, the EEG showed no rhythmic or epileptiform activity. The previously observed alpha rhythm was replaced by bilateral disorganized polymorphic slow activity (1,5-5 Hz). With resolution of clinical manifestations, the EEG spontaneously returned to normal within a few minutes, without any interictal epileptiform abnormality. *Conclusions:* Cerebellar fits can be misdiagnosed as epileptic spells. In our patient, the EEG was a useful diagnostic tool showing diffuse polymorphic slow activity without epileptiform abnormality. These findings led to the correct diagnosis and appropriate treatment of this potentially fatal condition.

P-018

Simultaneous intracranial EEG-fMRI at 3 Tesla: A phantom safety study using subdural electrodes in a high-field MR environment

SM Boucousis (Calgary), CJ Cunningham (Calgary), BG Goodyear (Calgary), P Federico (Calgary)*

Background: The integration of intracranial EEG with high-field functional MRI (fMRI) may help elucidate the mechanisms underlying seizure generation. We investigated the safety issues involved in the use of subdural EEG electrodes using a phantom head model as a necessary prerequisite for future intracranial EEG-fMRI studies in humans. *Methods:* A phantom was constructed to model the shape, size, and conductivity of the human head. An intracranial electrode grid (Ad Tech, Racine, WI) was secured on the phantom surface in an orientation similar to typical human implantations. Electrode displacement, temperature change, and induced current/voltage were measured in a variety of MR conditions. All measurements were performed at 3T (GE Signa Excite, Waukesha, WI) for T1-weighted, 3-plane localizer, 2D anatomical, T1-weighted, 3D anatomical, fluid attenuation inversion recovery, and fMRI. *Results:* The subdural electrodes showed no measurable movement or torque in the MR environment. Temperature change along the electrodes and in the surrounding tissue was <1°C over a one-hour scanning period. Induced voltage levels ranged from 100mV to 650mV at a frequency of 127 MHz (corresponding to the Larmor frequency at 3T). *Conclusions:* The results suggest that subdural intracranial electrodes should be safe for EEG-fMRI at 3T in the present conditions.

P-019

Safety and feasibility of using implanted depth electrodes for intracranial EEG-fMRI: a phantom study

SM Boucousis (Calgary), CJ Cunningham (Calgary), BG Goodyear (Calgary), P Federico (Calgary)*

Background: Epilepsy patients undergoing intracranial EEG provide a unique opportunity to further examine seizure propagation with the combined use of EEG and functional MRI (fMRI). In preparation for investigations involving humans, we assessed the MR safety of implanted intracranial depth electrodes at 3T. *Methods:* A

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phantom model constructed to emulate the shape, size, and conductivity of the human head was implanted with an intracranial depth electrode (Ad Tech, Racine, WI). Measurements were obtained for movement, temperature changes, and induced current in the device through a series of MR scanning conditions (structural and functional) at 3T (GE Signa Excite, Waukesha, WI). Data collection were performed with both the electrode unconnected, and connected to a commercial EEG-fMRI system (Neuroscan, El Paso, TX). *Results:* No measurable rotational or translational deflections were observed and temperature changes from depth electrodes were less than 0.5°C in all scanning conditions. All induced voltages oscillated at ~127MHz and ranged from 200-2800mV. Voltages induced with the commercial EEG-fMRI system oscillated at 60kHz or ~120kHz with a peak voltage of 450-650mV. *Conclusions:* These results suggest that intracranial depth electrodes should not pose a risk in performing intracranial EEG-fMRI at 3T in the present conditions.

General Neurology

P-020

Epilepsy surgery in patients above 50 years of age - preliminary meta-analysis findings

J McDermott (St Laurent), S Wiebe (Calgary)*

Background: Controversy surrounds the application of surgery as a treatment for epilepsy for older patients. Previous studies have been contradictory in the published rate of seizure recurrence following epilepsy surgery in older patients as opposed to younger patients. *Methods:* A systematic review of the literature from 2007 to 2002 with the keywords "epilepsy," "seizure" and "surgery" was performed. References from experts were also included. Data were extracted from studies containing post-operative seizure outcomes in a group of patients older and younger than 50 years. Our primary outcome is the point estimate of seizure freedom in the group of patients < 50 vs ≥ 50 years of age. Secondary outcomes include imaging, pathology and duration of epilespy. *Results:* Data were extracted from 33 studies including 1818 patients. An odds ratio of post-operative seizure freedom of 1.44 favouring patients younger than 50 was found (p=0.02). The rate of seizure freedom was 70% and 61.1% in the young and older groups respectively (p=0.009). *Conclusions:* The results in this study suggest that patients older than 50 years have a statistically significant decrease in the likelihood of attaining seizure freedom following epilepsy surgery. These preliminary findings merit further investigation.

P-021

Magnetoencephalography: A systematic review of its use in localization-related epilepsy

M Lau (London), D Yam (London), JG Burneo (London)*

Background: Magnetoencephalography (MEG) and magnetic source imaging (MSI) (MEG combined with structural imaging) provides a new, noninvasive tool for epilepsy localization. The purpose of this study was to determine how useful MEG/MSI is in the presurgical evaluation of localization-related epilepsies. *Methods:* We searched MEDLINE, the Cochrane library, and EMBASE between 1987 and 2006 for English articles. References of reviews and book chapters were searched. In addition, we contacted experts in MEG and epilepsy. Studies including a minimum of 4 patients with at least 6 months follow-up after surgery were reviewed. In each study, surgical outcome (seizure free versus not seizure free) was correlated with the concordance of MEG source localization and resection area. *Results:* We retrieved 189 articles. 38 papers (range: 4 to 41 patients) were selected. 6 studies (8 to 44 patients) allowed us to obtain sensitivity (range: 23-100%) and specificity (6 - 67%) values, and positive likelihood ratios (0.69 to 2.0) and negative likelihood ratios (0.0 to 2.13). Due to small patient sample size, we were unable to estimate the diagnostic impact of MEG in the remaining studies. *Conclusions:* There is insufficient evidence to ascertain the role of MEG in surgical planning of patients with localization-related epilepsy. Additional studies are needed.

P-022

Sequential motor phenomena of secondarily generalized seizures

SM Baz (London), WT Blume (London)*

Background: Experimentally, greater stimulus strengths applied to the brainstem reticular system was required to elicit tonic extension than tonic flexion (Burnham, 1987). Does a similar evolution occur in human epilepsy? *Methods:* We studied sequential features of secondarily generalized motor seizures in 8 patients undergoing video-EEG monitoring in our Epilepsy Unit. Seizures were identified when both ictal clinical, and scalp or subdural EEG criteria for focal and secondarily generalized seizures appeared. Both authors scrutinized sequential video frames to analyze motor events. *Results:* Motor phenomena began asymmetrically in 8/8, principally as tonic limb flexion/ extension combinations, and progressed to more symmetrical features in the majority. Arm positions evolved from asymmetrical flexion/extension to symmetrical flexion or extension, usually the latter. Leg positions in 8/8 progressed from asymmetrical flexion/extension to symmetrical extension. *Conclusions:* Of the 5 descending motor tracts, the reticulospinal most likely mediates such tonic phenomena in both arms and legs. Evolution toward tonic extension in most patients may reflect intraictal augmenting epileptogenesis. Progression from asymmetry to symmetry could reflect either intra-reticular or interhemispheric seizure propagation. Our data indicate an asymmetrical to symmetrical evolution of ictal motor phenomena in secondarily generalized seizures.

P-023

Metastatic testicular choriocarcinoma presenting as recurrent intracerebral haemorrhage and atypical angiographic appearance

G Pfeffer (Vancouver), MK Heran (Vancouver)*

Background: Testicular choriocarcinoma is a rare malignancy predominantly effecting young men. This malignancy metastasizes early and patients commonly present with sequelae of metastatic disease. *Materials and Methods:* We reviewed the imaging of a patient with metastatic choriocarcinoma presenting with recurrent intracerebral haemorrhage. *Results:* Cerebral angiogram demonstrated small posterior frontal foci of contrast puddling in the

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late arterial and capillary phase, persisting into the venous phase. Pathology subsequently revealed pure choriocarcinoma. *Conclusions:* Recurrent intracerebral haemorrhage as the initial presentation of metastatic testicular choriocarcinoma has not been reported previously. The above angiographic appearance should raise concern for metastatic lesions. Malignancies with high propensity for massive haemorrhage or rebleeding, as in this case, should be considered for early surgical management.

P-024

Empty sella in patients with diagnosis of pseudotumor cerebri

A Asghari Roodsari (Tehran), A Tabassi (Tehran), A Ghorbani (Tehran), H H.Kharazi (Tehran)*

Introduction: Pseudotumor cerebri is characterized by increased intracranial pressure without an intracranial mass lesion as the known cause. The empty sella turcica refers to an anatomic finding of a severely flattened but still present pituitary gland. The bony changes of the empty sella have been considered to be a positive imaging sign for IIH. The objective of this study was to determine whether magnetic resonance imaging (MRI) can be used to predict the presence of empty sella and its risk factors. *Materials and Methods:* In this case-control study during spring 2006, 36 patients with IIH and 36 normal subjects were enrolled. The mean age of IIH patients was 29.72±11.55 years; normal subjects was 31.22± 11.80 years. We devised a questionnaire including: age, sex, BMI, past medical history, drug history, symptoms and signs (headache, papilledema , VI cranial nerve palsy, optic atrophy, nausea, vomiting, tinnitus, vertigo, chorea movement), lumbar puncture results, the duration of the disease from the onset of symptoms and the results of MRI. The prevalence of empty sella was calculated and relationship between each factor with empty sella was obtained. *Results:* Twelve patients were obese, all of them were females. In normal subjects, there were no obese individuals. CSF pressure on lumbar puncture ranged from 20 to 54 cmHg. Duration of disease in 6 patients with empty sella was 44.67±37.43 months and in patients without empty sella was 17.33±18.25 months. Empty sella was found in 33.4% of patients and 11.2% of normal group. No significant relation was detected between risk factors and empty sella. *Conclusion:* In clinical view, empty sella were found more in the patient group than in the control group but in statistical analysis there was no significant relation with empty sella and IIH. We think it was because of small number of patients. Elevated intracranial pressure produces a constellation of MR imaging signs that can assist in establishing the diagnosis of pseudotumor cerebri.

P-025

Bilateral optic nerve head hemangioma in Von Hippel Lindau Disease

A Abdollahi (Tehran), Z Hallaji (Tehran), A Mirshahi (Tehran)*

Von Hippel Lindau is one of the phacomatosis. Whenever there is only hemangioma on the retina or optic disc, the entity is called Von Hippel disease, but in the cases of CNS involvement or visceral hemangioma, the entity is called Von Hippel Lindau (VHL). We report a case of VHL with multiple hemangioma in different organs. Case report: A 22 year-old woman presented with gradual visual loss in her right eye. Her visual acuity was 20/80 and 20/20 in right and left eyes respectively. Slit lamp examination was quite normal with no relative afferent pupillary defect. Fundi of both eyes revealed subretinal fluid in papilomacular bundle with macular pucker in right eye. Whole body MRI revealed a large hemangioma in the spinal cord. After 8 years the patient had significant visual loss at both eyes. This is the first report of VHL with bilateral optic nerve hemangioma in my country.

P-026

Ross Syndrome-a case series

H Chua (Singapore), J Chai (Singapore), K Lim (Singapore), S Lim (Singapore), S Ng (Singapore)*

Background: Ross syndrome is characterized by the triad of anhidrosis, hyporeflexia and tonic pupil. *Methods:* Two patients were identified from our hospital records from 2000 to 2007. *Results:* A 52-year-old male complained of sweating only in the right leg for 10 years. BP and pulse were 120/70 and 60. Pupil diameters: 2 mm (right) and 3 mm (left) in light, and 2 mm (right) and 4 mm (left) in dark. The right pupil was non-reactive to light but constricted well to a near target. The left pupil reacted normally to light and accommodation. Deep tendon reflexes were absent. After 0.1% pilocarpine, the right pupil constricted to 1 mm whereas there was no change in the left pupil. Sympathetic skin response was absent on the left hand.

A 44-year-old female complained of decreased sweating on the right face for 2 months. BP and pulse were 120/70 and 54. There was a right ptosis. Pupil diameters: 3 mm (right) and 7 mm (left). Both reacted sluggishly to light but constricted well to a near target. Deep tendon reflexes were absent. After 0.1% pilocarpine, both pupils constricted to 2 mm. On a separate visit, cocaine administration increased the size of the right pupil from 3 to 6 mm whereas the left pupil did not dilate. *Conclusion:* Ross syndrome lies on a spectrum of generalized injury to the autonomic and dorsal root ganglia.

P-027

Compulsive gambling induced by Pramexipole in a patient with restless leg syndrome

B McLane (Calgary), GM Klein (Calgary)*

Background: Although the incidence of compulsive gambling in patients with Parkinson's Disease (PD) is not well defined, it may be increased compared to the general population. Therapy with dopamine agonists, and in particular Pramipexole, may increase the risk of impulse control disorders (ICDs) including compulsive gambling. *Methods:* We present a case of a 60 year old female who developed compulsive gambling while receiving Pramipexole for restless leg syndrome. *Results:* A female patient aged 60 had a 33 year history of restless leg syndrome. She was intellectually normal and had no prior history of ICDs. Four years prior to presentation, she was started on Pramipexole 0.25 mg at hs and this was increased to 0.5mg without complications. After three years of therapy, her dose was increased again to 1mg daily at hs. Shortly afterwards, she developed compulsive gambling with a catastrophic effect on her personal life. She required admission to a psychiatric facility. Neurologic examination was normal. Discontinuation of Pramipexole resulted in an almost immediate cessation of gambling with minimal therapy. Follow-up at one year was uneventful, with no

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history of ICDs. *Conclusion:* The link between PD, dopamine agonists and ICDs is previously well documented. Although there is concern about the use of dopamine agonists in other conditions, there is no reported association between restless leg syndrome, Pramipexole and ICDs. Patients given dopamine agonists for any reason should be monitored closely and warned of the risks.

P-028

Neurological complications of miliary tuberculosis

A Kar (Lucknow)*

Introduction: Miliary tuberculosis is an uncommon presentation of tuberculosis. There are only a few studies showing CNS complications. *Material and Method:* Patients with pulmonary miliary mottling were included. A clinical evaluation was done in all patients. HIV serology and cerebrospinal fluid examination, imaging of brain and spinal cord were performed. Patients were treated with antituberculous treatment and were reevaluated after a period of six months. *Results:* Fifty-nine patients of miliary tuberculosis with neurological involvement were included. Five patients were HIV positive. Fifty-two patients had tuberculous meningitis with or without cerebral parenchymal tuberculoma. Thirty-two patients had tuberculoma. Twenty patients had multiple small tuberculomas while the rest had solitary tuberculoma. Five patients had disseminated tuberculosis and neuroimaging revealed tuberculomas in spinal cord as well. Three patients had Pott's spine and paraplegia. In three patients neuroimaging was normal clinically these patients had transverse myelitis. One HIV- positive patient neuroimaging revealed lesions of PML. On follow up 15 patients expired. Fourteen patients developed drug induced hepatitis and modified antituberculous treatment was given. Thirty patients showed significant improvement. *Conclusion:* Miliary tuberculosis, is an uncommon form of tuberculosis, with frequent CNS involvement, the commonest being tuberculous meningitis and tuberculomas. Miliary tuberculosis continues to have high mortality and morbidity.

P-029

Multiple enhancing computed tomography lesions of brain: a diagnostic evaluation

R Garg (Lucknow)*

Objective: Data about multiple enhancing computed tomography brain lesions are limited to case reports. *Material and Method:* One-hundred and ten consecutive patients with two or more enhancing CT imaging lesions of less than 20 mm in diameter were subjected to clinical evaluation and a battery of tests. *Results:* Infective pathology was the most common etiology, followed by neoplastic diseases. The commonest infective pathology was tuberculosis. Neoplastic etiology was common non-infective etiology. In the majority, brain lesions represented a metastatic manifestation of systemic neoplastic disorder. Lung carcinoma was the commonest primary malignancy. Among 4 HIV-infected patients, one had toxoplasmosis and two patients were diagnosed to have cryptococcal meningitis. Forty-five patients, who remained undiagnosed after initial evaluation, were treated empirically with antituberculous drugs and corticosteroids. In 10 patients CT lesions completely disappeared. In 5 patients the number of CT lesions decreased. Six patients died. In 24 CT remained unaltered. Six patients showed metastatic lesions on repeat X-ray chest. *Conclusions:* A large number of infectious and non-infectious diseases can cause multiple enhancing CT lesions. Clues to the diagnosis reside outside the nervous system. The specific diagnosis may remain a challenge in a large number of the cases.

P-030

Effects of vit-C on lead toxicity on rat hippocampus

F Kermanian (Tehran)*

Lead is a potent neurotoxic agent.One of the suggested mechanisms of lead toxicity is production of reactive oxygen species.The present study sought to examine the effects of vitamin C after lead-induced toxicity in rat hippocampus. Control animals received lead acetate 25mg/kg/day by intraperitoneal injection for 10 days.Experimental group received lead acetate by same dose and vit-C 100mg/kg/day in drinking water for 10 days.In both groups blood lead level was 79.2 micro gram/dl.In western blot analysis the ratio of Bax/Bcl-2 protein expression in hippocampus was significantly decreased compared to controls. In conclusion the lead induced cell death in hippocampus and vit-C, as an antioxidant can reverse this.
Key words:Lead(Pb)- hippocampus-Bax-Bcl2

P-031

Granulomatous angiitis associated with cerebral amyloid angiopathy: A case report with radio-pathological correlation

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Background: Cerebral amyloid-angiopathy (CAA) is a common cause for intracranial hemorrhage and cognitive deterioration in the elderly population. It has rarely been associated with a granulomatous vasculitis attributed to amyloid-deposition. *Methods:* We report a case of a patient presenting with subacute cognitive deterioration and a diffuse leucoencephalopathy without previously known CAA. Clinical evolution, EEG, radiological and post-mortem pathological data are presented. *Results:* An 85-year old right-handed woman with mild cognitive impairment presented with a 3-week history of cognitive decline and psychomotor slowing. Clinical examination revealed mild left hemiparesis and hypoesthesia, left hemianopsia and apraxia. MMSE was 18/30 with mnestic and visuospatial deficits. CSF protein was elevated, cell count was normal. MRI showed diffuse extensive T2 hypersignal of the white matter of both hemispheres. Right hemispheric slowing was present on EEG. Two weeks later the patient acutely deteriorated due to multifocal intralobar hemorrhages. Post-mortem examination confirmed the presence of diffuse perivascular amyloid deposits and granulomatous angiitis with vascular occlusion. *Conclusion:* We report a case of Amyloid-beta associated angiitis presenting with vasculitic features before the occurrence of intracranial hemorrhage. Early recognition of this entity may lead to anti-inflammatory treatment.

P-032

Incidence of migraine in high school students in Khorramabad

P Bahrami (Khorramabad), S Nadri (Khorramabad), H Mahmmodvand (Khorramabad)*

Background: Migraine is the most common type of headache in the world and is one of the most important causes of patients coming to the neurologist office. The aim of this study was determination of prevalence of migraine in high school students in Khorramabad City. *Methods:* This is a descriptive study which was done on 2213 high school students, that accidentally chosen from couple of times a multi-step random sampling. Gathered instrument of information was a questionnaire form, which includes two parts: First part contained basic information(age, sex....) and the second part had the main questions about; headache, nausea, vomiting, location of headache, time when headache started, visual problems and other symptoms or signs accompaniment with headache...

The information was analyzed by SPSS 9.0 software. *Results:* The overall incidence of headache was 44.46 %(31.09% in male and 68.91% in female group). According to the sampling population incidence of common migraine is 13.06 percent in this group. The most common age with headache in this study was 18 years old. The most common type of headache was common migraine (65.45%) and other types in order were; tension headache (32.53%), ophthalmologic migraine (1.12%), migraine variant (0.5%) and hemiplegic migraine (0.4%). *Conclusion:* According to high school incidence of headache in population were studied and many problems that coming after headache in this age. Attention to the treatment of headache is very important to improve their life quality.

Key words: Headache, and Migraine, Common migraine.

P-033

Tramadol induced seizure disorder

P- Bahrami (Khorramabad), K Mahkami (Khorramabad)*

Introduction: Tramadol is a new synthetic analgesic drug and is used to relive pain, including post surgical pain. Effects of tramadol are similar to those of narcotic analgesic. Although tramadol not classified as a narcotic agent, but can produce physical and psychic dependency, it may increase risk of seizure in a patient without taken other medication or in a patient on other medications such as SSRI, TCA, or anti psychotic drugs. *Methods:* This is a cross sectional descriptive study and was performed during 6 months (1st June-31th October 2006) in Khorramabad. We collected information by a questionnaire form which includes general information and specific questions about tramadol & seizures. *Results:* In this study 45 patients (between 15-45 years old) with confirmed seizure due to use of tramadol were reported. Thirty patients were male(66.7%)and fifteen were female (33.3%). The most common type of seizure was tonic-clonic. Seizures occurred in 24 patients (53.33%) after a single dose of tramadol, and in 21 patients(46.67%) after multiple doses. 20% of patient had abnormal EEG without any focal findings. In all patients, seizure occurred within 24 hours of taking tramadol. Twelve patients (26.66%) used tramadol at a higher than therapeutic dose (>600mg/day). *Conclusion:* This study indicated it is important to consider tramadol as a possible cause of seizure, even when used at recommended doses. SSRI (Serotonin Selective Reuptake Inhibitor),TCA (Tricyclic Antidepressants)

P-034

Longitudinal motor cortex and spinal motor neuron changes in multiple system atrophy

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Background: Multiple system atrophy (MSA) has clinical features of parkinsonism, dysautonomia, and cerebellar ataxia. The variability in presentation and lack of a specific test poses a diagnostic challenge. We report the utility of several research tools to help clarify the diagnosis in suspected MSA. *Methods:* In a 50-year-old female who presented with a generalized pyramidal syndrome mimicking primary lateral sclerosis, we investigated the extent of motor neuron degeneration and the possibility of amyotrophic lateral sclerosis (ALS) using motor unit number estimation (MUNE), transcranial magnetic stimulation, magnetic resonance spectroscopy, and diffusion tensor imaging. *Results:* Although no clinical features of lower motor neuron (LMN) pathology developed during her course and the EMG/NCS was normal, the left extensor digitorum brevis MUNE showed 79% motor neuron dropout but without progression after 7 months. In contrast, the left thenar muscles were normal. The remaining investigations indicated progressive cerebral and pyramidal tract degeneration. After one year she developed orthostatic hypotension and parkinsonism consistent with MSA. *Conclusion:* To our knowledge, this is the first study evaluating MSA using MUNE. Despite the progressive cerebral degeneration, the lack of progression on the MUNE study argued against ALS. Long standing subclinical LMN loss can be pronounced in some MSA patients.

P-035

Etiology of oculomotor nerve paralysis

Z Hallaji (Tehran), A Abdollahi (Tehran), A Tbasi (Tehran)*

Purpose: To determine the etiology of oculomotor nerve paralysis over a one year period at a university-based hospital. *Methods:* This observational case series was conducted on consecutive patients with a clinical diagnosis of isolated oculomotor nerve paresis who were referred to the neuro-ophthalmology clinic at Farabi Eye Hospital. Tehran, Iran. All patients were evaluated for hypertension and diabetes mellitus. In patients with confirmed diabetes mellitus or hypertension, oculomotor nerve palsy was diagnosed as ischemic. However, if no recovery was observed for up to four months, the patient underwent MRI and MRA. The etiology of oculomotor nerve palsy was classified into six categories including ischemia, trauma, and aneurysm, neoplasm, miscellaneous and idiopathic. *Results:* During the period of the study, 28 eyes of 28 patients (17 male and 11 female subjects) with mean age of 50.5 years were enrolled. Blepharoptosis was observed in 89.3%. Pupil reaction was normal in 50%, sluggish in 14.3% and absent in 35.7%. Pupil size was normal in 57.1% and mydriatic in 42.9%. The paralysis was ischemic in 42.8%, traumatic in 14.3%. aneurysmal in 7.1%, neoplastic in 7.1%, miscellaneous in 10.7% and idiopathic in 17.8% of the cases. *Conclusion:* In the present series, ischemia was the most common cause of oculomotor nerve palsy in which the most prevalent underlying disorder was diabetes mellitus.

P-036

CADASIL

A Malhotra (Hartford), D Chenouda (Newington)*

A 41 year-old male with no past medical history presented with gradually worsening bizarre behaviors, memory loss, headaches, weight loss over 1.5 years. His mother was diagnosed with Alzheimer's dementia at 61, and a sister with multiple sclerosis (MS). He had occasional alcohol intake, cocaine use until 6 months prior and no IVDA. Physical exam showed slurring of speech and 28/30 on mini-mental test. Results of CBC, chemistries, ESR, TSH, B12, liver function, HIV, JC virus, RPR, Lyme disease, hepatitis C were normal. CT scan brain showed abnormal hypodensities and MRI revealed a demyelinating process. CSF analysis was normal. Reported mood and behavioral changes were consistent with frontal apathy and probable cerebro-vascular depression on neuro-psych evaluation. Review of MRI of patient's sister (who developed similar headaches at 40) revealed extensive white matter disease with multiple foci in the peri-ventricular white matter, corona radiata bilaterally. Her CSF analysis done twice had not shown any features of MS. Development of early dementia in his mother raised the possibility of an inherited disorder. Molecular diagnosis was achieved by a skin biopsy showing osmiophillic accumulations on electron microscopy (EM) consistent with CADASIL. *Discussion:* Cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL) is a relatively recently described autosomal dominant disorder caused by mutations of notch3 gene located on chromosome 19q12. The disease was first described in 1955 and has only recently been recognized as a distinct entity. Pathologically, it shows stereotypic degeneration of small and medium sized vessels with the deposition in the media of non-atheromatous substance that under EM appears as granular osmiophilic material pathognomonic of the disease. This leads to vessel narrowing and the clinical manifestations like headaches and cognitive decline. The hyper-intensities of white matter of the anterior temporal lobes and involvement of the external capsule on MRI help to distinguish it from MS. There is no specific treatment and death occurs after a mean of 20 years.

P-037

Central pontine myelinolysis masquerading as a sensory neuronopathy

JA Fraser (London), SA Morrow (London), MS Jog (London), DH Lee (London), SL Venance (London), SM Mirsattari (London)*

Background: Central pontine myelinolysis (CPM) is a demyelinating disorder affecting the pons, most typically seen following the rapid correction of hyponatremia. Alcoholic and malnourished patients are particularly prone to developing CPM. The cardinal clinical features include psychiatric disturbance, pseudobulbar palsy, and spastic quadriparesis. Sensory involvement has never been reported before. *Methods:* We report the case of a 48 year-old woman who, following fluid resuscitation for hypotension and hyponatremia and a short psychiatric admission for a confused state, developed new-onset whole-body paresthesias and gait difficulties. Examination was normal apart from the findings of absent reflexes, profound sensory ataxia, and markedly decreased pinprick and vibration sense in all four extremities. *Results:* Cranial MRI demonstrated signal change within the pons consistent with acute CPM. Extensive workup, including EMG/NCS, SSEPs, paraneoplastic and anti-ganglioside antibodies, EEG, and CSF analysis ruled out sensory neuronopathy, among other causes, and confirmed a central cause for her sensory impairment. With conservative measures alone, within four months, the patient returned nearly to her baseline. Follow-up MRI showed destruction of the central pons. *Conclusions:* This unique case demonstrates that CPM can masquerade as a sensory neuronopathy.

P-038

Gray matter atrophy In primary lateral sclerosis

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Background: Primary lateral sclerosis (PLS) is an idiopathic, neurodegenerative disorder of the upper motor neuron. Cortical atrophy in the precentral area has been observed with MRI. The aim of this study was to quantify whole brain atrophy in PLS patients and assess whether there was loss of gray matter (GM), of white matter (WM) or both. *Methods:* High resolution T1-weighted images were acquired in PLS patients and controls. SIENAX was used to calculate whole brain GM, cortical GM, WM, whole brain volume (WBV) and ventricular CSF. Mann-Whitney tests were used to compare the two groups. *Results:* Ten PLS patients and seven age-matched healthy controls were part of this study. Patients and controls did not have any significant difference in brain volumes but there was a trend for a significantly lower GM volume in patients. Disease duration correlated with cortical GM/whole brain GM volume, rho = -0.636, p=0.048. Disease severity as assessed by the ALSFRS-R correlated with ventricular CSF, rho = -0.772, p=0.009. *Conclusions:* Our preliminary results suggest that there may be mild GM atrophy in PLS. Ventricular CSF was the most sensitive measure to atrophy and correlated with disease severity. Disease duration appears to be related to cortical GM loss.

P-039

Gordon Holmes Syndrome: A case of hypogonadotropic hypogonadism and cerebellar ataxia

FC Lam (Edmonton), MK Heran (Vancouver)*

Gordon Holmes Syndrome (GHS) is a rare neurologic syndrome characterized by progressive cerebellar ataxia and hypogonadism with or without choroidal dystrophy, ectodermal dysplasia, sensorineural deafness, short stature, developmental delay, and polyneuropathy. Patients with this syndrome experience progressive cerebellar volume loss and dysmyelination of their white matter tracts. The etiopathology of this syndrome is unknown. We present a case of a 26 year old male with GHS who has had serial imaging and clinical documentation of his disease progression since the time of his diagnosis at the age of 10. To the best of our knowledge, this is the first report of a patient with GHS in whom serial studies have been performed, with a stable dysmyelinating pattern over 10 years, and progression of cerebellar volume loss over 16 years of follow-up.

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P-040

HIV presenting as myelopathy and bilateral optic neuropathy

J Lee (Vancouver), G Pfeffer* (Vancouver)*

Background: HIV can cause disease throughout the neuroaxis and lead to a variety of neurological manifestations, including encephalopathy, myelopathy, peripheral neuropathy and myopathy. These neurological manifestations are either directly related to the HIV virus itself, or more commonly, related to an opportunistic infection or malignancy. *Methods:* We reviewed the chart and imaging of a patient presenting with subacute onset of bilateral spastic paraparesis and bilateral painless visual loss related to HIV infection. *Results:* This 44 year old man was discovered to be HIV positive with a CD4 count of 84. MRI of brain and spinal cord demonstrated diffuse white matter T2 signal abnormality, most pronounced in the corticospinal tracts of the brain stem and spinal cord, and the optic tracts and nerves. Broad investigations excluded opportunistic infection or malignancy, mitochondrial disease, adrenoleucodystrophy or demyelinating disease. *Conclusions:* To our knowledge this is the first case of AIDS presenting as simultaneous HIV-related myelopathy and bilateral optic neuropathy. HIV infection should be considered in the differential diagnosis of patients with a wide variety of neurological symptoms and signs.

P-041

Leukoencephalopathy with calcifications and cysts: a case report

RK Zabad (Calgary), J Scott (Calgary), LM Metz (Calgary)*

Background: We report a case of leukoencephalopathy with calcifications and cysts (LCC) in an 18-year old man.This rare entity is characterized by extensive white matter changes, calcifications and cysts. Clinical presentation is heralded by seizure. Subsequent course is characterized by rare seizures, pyramidal, extrapyramidal, cerebellar and cognitive deficits. Most importantly cysts might enlarge significantly necessitating decompressive surgeries. *Method:* Case report. *Result:* Patient had no dysmorphic features. Neurological examination showed brisk reflexes and upgoing toes. Neuropsychological testing was normal. MRI of the brain with and without contrast showed extensive demyelination with foci of nodular enhancement and calcifications in the left thalamus and pons. Extensive immunological, infectious, metabolic and demyelinating workup was negative. He was started on lamotrigine following a second seizure. Repetitive examination and MRI of the brain were unchanged. However the last MRI showed a new calcification and a cyst in the left temporal white matter. MRS over the posterior and parietal white matter showed a mild decrease in NAA and an increase in choline relative to creatinine. *Conclusion:* This case adds to the list of rare patients with LCC. Histological analysis of biopsied cases showed microangiopathic changes.

General Neurosurgery

P-042

Apoplectic resolution of a pituitary macroadenoma following cardiac surgery

K Mukhida (Toronto), G Kolyvas (Saint John)*

Background: Pituitary apoplexy, a clinical syndrome resulting from acute hemorrhage or infarction of a pituitary tumour, is known to occur spontaneously but can be associated with trauma, radiation therapy, and anticoagulation. Pituitary apoplexy after cardiac surgery is rare and all but one reported case have required neurosurgical intervention. The case of a pituitary macroadenoma that presented with apoplexy after cardiac surgery but spontaneously resolved over seven months is described. *Methods:* A 71 year-old man with a past medical history significant for cardiovascular disease and type II diabetes mellitus underwent coronary artery bypass grafting. Post-operatively, he developed severe headache and a right third nerve palsy. Imaging studies confirmed a pituitary macroadenoma with apoplexy. *Results:* The patient was treated with dexamethasone and his symptoms gradually improved over one week. Follow-up examinations demonstrated resolution of his symptoms. By seven months post-operatively, the tumour had spontaneously resolved and no recurrence has been documented even after three years. *Conclusions:* Spontaneous resolution of a pituitary macroadenoma post-cardiac surgery due to apoplexy is a rare event and this case suggests that surgical intervention may not always be necessary in clinically stable patients without significant neurological or visual disturbance and with appropriate follow-up.

P-043

Dermal sinus tract and intradural dermoid cyst presenting in late adulthood: a case report and literature review

A Raut (Hamilton), A Fallah* (Hamilton), K Reddy* (Hamilton)*

Background: Dermal sinus tracts are commonly observed in childhood and range from asymptomatic presentations to recurrent infections and neurological abnormalities. Spinal dermal sinus tracts typically occur in the lumbosacral region and can be associated with other structures such as dermoid cysts. We present a unique case of a congenital dermal sinus tract in the thoracic region with an uncommon and recurrent presentation in late adulthood. *Clinical Presentation:* This 60 year old gentleman presented with a recurrent dermal sinus tract with an associated dermoid cyst in the mid-thoracic region and periodic abscess formation. He has experienced recurrent sinus infections since 20 years of age, and has undergone multiple non-curative surgical procedures. *Resulting Intervention:* A complete surgical excision of the tract and dermoid cyst was performed. The patient was discharged after one day of post-operative stay, and further follow-up was uneventful. *Conclusion:* While Dermal Sinus Tracts present more commonly in younger populations, its diagnosis should not be excluded in late adulthood. They must especially be considered with adult patients presenting with midline infections of a recurrent nature.

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P-044

Nodular Fasciitis presenting simultaneously in the obturator nerve and gracilis muscle: Case Report

A Fallah (Hamilton), J Lu (Calgary), J Grochmal* (Calgary), L DiFrancesco (Calgary), M Khalil (Calgary), AW Clark (Calgary), R Midha (Calgary)*

Nodular fasciitis is reactive proliferation most commonly presenting in the subcutaneous fat of the forearm; only two cases of intra-neural nodular fasciitis have ever been reported. We report an intraneural case of obturator nodular fasciitis, that presented both intra-neural and intra-muscular, with the lesion capsule being adherent to the gracillis muscle overlying it. This case presented as a newly developed thigh mass in a 34 year old post-partum woman, which manifested over the course of several months. Examination and imaging suggested that this was a peripheral nerve sheath lesion, although intraoperatively the specimen was atypical. Obturator nerve fascicles pervaded the lesion capsule in a circumferential fashion, while the mass itself demonstrated a partially cystic core. The lesion was removed in a piece meal fashion, so that obturator nerve fascicles involving the inner wall of the tumor capsule could be spared. The pathology, which can be easily mistaken for a neurogenic or soft tissue sarcoma, was typical for nodular fasciitis, showing proliferation of spindle cells arranged in a loosely textured mucoid matrix, and infiltration of scattered chronic inflammatory cells. Also, the diffuse and strong immunoreactivity for Smooth Muscle Actin confirmed the cellular origin of myofibroblasts. The patient has normal obturator nerve function post-operatively and is doing well. To our knowledge, this is the first reported case of this lesion presenting in a nerve of the lower extremity, and also within muscle. The differentiation from a soft tissue sarcoma rests on an appropriate excisional biopsy and expert histopathology evaluation.

P-045

An alternative service delivery model for infants with positional plagiocephaly

P Mortenson (Vancouver), J Rippon (Vancouver), P Steinbok (Vancouver)*

Background: The incidence of positional plagiocephaly (PP) has increased over the last 15 years, creating challenges in managing referrals for neurosurgical consultation. In response, service delivery was reorganized, with such infants channeled to a group clinic supervised by a trained occupational therapist, with support from the neurosurgical division. *Objectives:* To describe organization of the clinic and assess the impact on wait times for consultation and acceptability of the clinic format to parents. *Methods:* Volunteer anonymous 5 point Likert scale parent evaluations were collected over the first year of the clinic, and waitlist times were monitored. *Results:* The clinic starts with an educational parent group session followed by individual assessment, with emphasis on developmental strategies for infants <5 months, and counseling regarding head band treatment for older infants. Fifty-three parent evaluations were completed. Parents reported feeling comfortable in the group setting (mean=4.75, sd 0.65), meeting other families was helpful (mean=4.58, sd 0.8), having all of their questions answered (mean=4.83, sd 0.43) and positive experience (mean=4.9, sd 0.34). Wait times for infants with PP have decreased from 4 to <1 months. *Conclusion:* The group clinic format has been successful in meeting needs of parents and improving access to timely service.

P-046

Early versus delayed cell transplantation in the partial lesion Parkinsonian rodent model

TJ Phillips (Halifax), D Sadi (Halifax), M Hong (Halifax), I Mendez (Halifax)*

Background: Cell transplantation strategies are a promising therapy for Parkinson's disease. However, the optimal time to transplant replacement dopaminergic cells is not known. The objective of the present study was to examine the functional effects of transplanting fetal dopaminergic cells into the striatum at different times following dopaminergic cell lesions in parkinsonian rats. *Methods:* After intrastriatal 6-hydroxydopamine lesions, rats received intrastriatal transplants of fetal dopaminergic cells at either 3, 6, or 9 weeks post-lesioning. Control rats received intrastriatal saline injections post-lesioning. Animals were tested every two weeks following transplantation for rotational bias to amphetamine challenge and forelimb akinesia. 6 weeks post-transplantation, brain sections were analyzed histologically. *Results:* Animals receiving transplants three weeks post lesion showed a significant improvement in rotational bias and forelimb akinesia post-transplantation and greater transplanted cell survival than other animals. *Conclusions:* These findings suggest that early intrastriatal transplantation of dopaminergic cells produces functional recovery and increased overall transplanted cell survival. These findings strongly suggest that early transplantation is superior in the rat model for PD and may have significant implications in clinical neurotransplantation for PD.

P-047

Chiari 1 and hydrocephalus:another treatment alternative

G Lapointe (Québec), A Turmel (Québec)*

Objective: To present another treatment option for patients presenting with a Chiari 1 malformation and hydrocephalus.
Methods and Results: Chiari 1 and hydrocephalus is uncommon and presents a therapeutic dilemma. We present the case of a patient who consulted for chronic headaches and neck pain. Radiological exams confirmed the presence of a Chiari 1 malformation and concomitant obstructive hydrocephalus. An endoscopic third ventriculostomy (ETV) was attempted as the first line of treatment. The patient did not improve after the first ETV but a second exploratory endoscopy was tried and confirmed the occlusion of the first stoma. A new ventriculostomy was done and the patient improved significantly. On radiological exams done 3 and 6 months post-operatively, we observed a reduction of ventricular size and a complete resolution of the Chiari 1 malformation confirming the acquired nature of the presumed Chiari 1 malformation. *Conclusion:* ETV can be a treatment option for patients presenting with both a Chiari 1 malformation and hydrocephalus.

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P-048

The role of bFGF-2 in the retrograde repression of axonal regeneration after injury in the central nervous system

AS Wu (Saskatoon), DR Fourney (Saskatoon), D Schreyer (Saskatoon)*

Background: The expression of growth associated proteins such as GAP-43 is required for axon regeneration, and is retrogradely regulated by inhibitory factors such as bFGF-2 at the axon target site. Regrowth occurs when this inhibition is interrupted by injury. In the CNS it appears that inhibition is maintained by multiple local and distal axons despite injury. *Methods:* Transcallosal neurons in rats were labeled with a fluorescent marker. Distal axons were severed by stereotactic callosotomy, and local bFGF-2 signaling was interrupted with an infusion of a function blocking antibody. GAP expression was quantified after seven days using in-situ hybridization of GAP-43 mRNA. *Results:* Mean GAP-43 expression, corrected for background, in animals with callosotomy combined with antibody infusion (12.85, S.E.M. 0.51), were significantly higher than in animals that received bilateral saline infusions (5.73, S.E.M. 0.31) or callosotomy alone (6.78, S.E.M. 0.71). *Conclusions:* Interrupting local bFGF-2 signaling increases GAP-43 expression in transcallosal neurons after distal axons are injured by callosotomy. GAP-43 expression is not up-regulated after injury when local bFGF-2 signals are maintained.

P-049

Spontaneous regression of cervical facet synovial cysts - a case report and review of literature

BW Lo (Hamilton), S Banglawala (Hamilton), K Reddy (Hamilton)*

Background: Spontaneous regression of cervical facet synovial cysts is a very uncommon entity. The natural history and possible mechanism of their formation and resolution remain controversial. *Methods:* To our knowledge, there is only one report on spontaneous and complete resolution of cervical facet synovial cyst. Review of literature reveals that these synovial cysts most frequently occur at the C7/T1 facet. The reason for such occurrence is not unknown. *Results:* We present a case of an 88 year-old female with an 18-month history of progressive left C8 radiculopathy, secondary to left C7/T1 facet synovial cyst causing foraminal stenosis of the exiting left C8 nerve root. On follow-up MRI at one year, this synovial cyst completely resolved. However, the patient's symptoms persisted, due to neuroforaminal narrowing from osteophytes. Thus, minimally invasive METRx(tm) tubular system was used for left C7 hemilaminectomy with C6/7 and C7/T1 foraminotomies. This procedure was well tolerated with no complications. The patient's symptoms are improving at three month follow-up. *Conclusions:* Cervical facet synovial cysts may be caused by mechanically stressed joints leading to an inflammatory cascade and synovial proliferation. Rarely, withdrawal of such stress may lead to their spontaneous resolution.

P-050

Case of Chiari Type I Malformation in an infant with Type 2 Pfeiffer Syndrome and Cloverleaf Skull Deformity: further evidence for an acquired pathogenesis

A Al-Hayek (London), D Matic (London), A Ranger (London)*

Background: The Chiari Type I malformation has been described in the setting of congenital fusion of the cranial sutures and may occur in patients with Cloverleaf skull deformity. The pathogenesis remains in dispute and has typically been regarded as a congenital accompaniment to the cranial vault abnormality. We describe a 6 month old infant with Pfeiffer Syndrome, Type 2, with Chiari Malformation which was not present at birth. We postulate that this case provides some additional evidence of an acquired pathogenesis for the Chiari malformation in multiple suture synostosis syndromes. *Methods:* A term infant was delivered with Pfeiffer Syndrome Type 2. Early imaging demonstrated multiple suture fusion, but no evidence of a Chiari Type I malformation. He underwent multiple cranial surgeries, imaging at 4 months disclosed a Chiari Type I malformation which did not improve radiographically following shunting. *Results:* This infant has undergone 2 cranial corrective procedures and bilateral placement of VP shunts. He remains asymptomatic with respect to the Chiari malformation, but requires ongoing monitoring for sequelae of posterior fossa herniation, in addition to anticipated requirements for further cranial vault and orbital corrective procedures. *Conclusions:* Our case provides some additional evidence for an acquired pathogenesis for the Chiari Type I malformation in the setting of complex craniosynostosis. Herniation is likely a consequence of brain deformation occurring in response of intracranial hypertension and not a primary malformation of the brain.

P-051

Decompressive hemicraniectomy in large putaminal haematoma: an Indian experience

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Objective: The treatment of large putaminal haematomas is predominantly medical and the role of surgery is debated. Decompressive hemicraniectomy in large hemispheric infarctions has been reported to lower mortality and improve outcomes. *Methods:* Twenty one cases of putaminal haematoma who underwent decompressive craniectomy in the last four years in both institutions were taken up and analysed. The parameters looked up included clinical presentations, the radiological profile, the time interval from ictus to surgery and the Glasgow Outcome score at three months. *Results:* There were twelve males and nine females with ages ranging from 29 to 68. All of them had neurological deficits, seven patients had GCS 3 - 8, 11 had 9-12 and above 13 in 3. Seventeen patients were hypertensive. CT was done in all. Radiological profile noted were intraventricular extension in two, right sided lesion in 12 and mass effect in all cases. The size of the haematoma was < 3 cm in 8 cases, 3 - 5 cm in 10 and > 5cm in 3. At three months, 12 patients were independent, four had minimal deficits and three were dependent. There were two deaths. *Conclusions:* Decompressive hemicraniectomy can be a useful alternative surgical procedure in moderate to large putaminal haematomas.

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P-052

Nodular Fasciitis presenting simultaneously in the obturator nerve and gracilis muscle: case report

JK Grochmal (Calgary), A Fallah (Hamilton), J Lu (Calgary), L DiFrancesco (Calgary), AW Clark (Calgary), R Midha (Calgary)*

Nodular fasciitis is an uncommon myofibroblastic tumor most commonly presenting in the subcutaneous fat of the forearm; only two cases of intra-neural nodular fasciitis have ever been reported. We report an intraneural case of obturator nodular fasciitis, that presented both intra-neural and intra-muscular, with the tumor capsule being adherent to the gracillis muscle overlying it. This case presented as a newly developed thigh mass in a 34-year-old post-partum woman, which manifested over the course of several months. Examination and imaging suggested that this was a peripheral nerve sheath tumor, although intraoperatively the specimen was atypical. Obturator nerve fascicles pervaded the tumor capsule in a circumferential fashion, while the lesion itself demonstrated a partially cystic core. The tumor was removed in a piece meal fashion, so that obturator nerve fascicles involving the inner wall of the tumor capsule could be spared. The pathology, which can be easily mistaken for a neurogenic or soft tissue sarcoma, was typical for nodular fasciitis, showing spindle cell proliferation set in a loosely textured mucoid matrix, and scattered chronic inflammatory cells The patient has normal obturator nerve function post-operatively and is doing well. To our knowledge, this is the first reported case of this lesion presenting in a nerve of the lower extremity, and also within muscle. The differentiation from a soft tissue sarcoma rests on an appropriate excisional biopsy and expert histopathology evaluation.

P-053

Endoscopic repair of craniosynostosis

V Mehta (Edmonton), W Beaudoin (Edmonton), L Peterson (Edmonton), K Aronyk (Edmonton)*

Background: The spectrum of surgical repair for sagittal synostosis has evolved from minimal strip craniectomy to total cranial vault reconstruction. Recently, suggestions have been put forth that an endoscopic surgical approach may be a less invasive alternative with acceptable results. Ideal candidates appear to be young infants where the ultimate postoperative results are bolstered by natural skull growth and postoperative helmetting. Less invasive surgery may also translate into shorter postoperative hospitalizations, less blood transfusions, and improved parent satisfaction. *Methods:* Over the last five years, we have gradually changed our approach to a more minimal operative exercise. Key changes have included age for surgery, a stepwise decrease from full bicoronal incisions to small 3.5 cm incisions, the introduction of postoperative molding helmets, less rigid fixation and the introduction of endoscopes. Currently endoscopic repair for craniosynostosis is not routinely being offered in Canada. *Results:* From our short experience, we will share technical issues, operative results and postoperative satisfaction scores. We will also touch on some of the controversy with regards to the length of postoperative helmetting that may be required. *Conclusions:* We have been pleasantly surprised with the results of our more minimal approach. Our belief is that endoscopic repair for craniosynostosis should be part of the routine surgical armamentarium of Canadian pediatric neurosurgeons.

P-054

Rupture of arachnoid cysts in children: a report of 2 cases

FB Maroun (St. John's), G Murray (St. John's), J Jacob (St. John's), R Avery (St. John's), M Alam (St. John's), S Bridger (St. John's), B Cramer (St. John's)*

Background: Arachnoid cysts represent 1-5% of intracranial non-traumatic mass lesions. Rupture of these cysts in the subdural space, with or without minor trauma, can produce signs of increased intracranial pressure and need prompt surgical treatment. *Methods:* Two cases of minor head injury precipitating rupture arachnoid cysts into the subdural space in the pediatric population are presented. In each case, the child was initially well, but developed increasing headaches as well as signs of increasing intracranial pressure. Serial CT scanning in each patient revealed evolving subdural fluid collections in association with the arachnoid cyst hemorrhage, creating significant mass effect. Both patients underwent emergent surgical management of the subdural collections. Post-operatively, full recovery without neurological sequelae was reached for each child. *Conclusion:* About 75% of symptomatic cysts manifest themselves in early childhood. The clinical presentation in this age group is raised ICP, seizures and focal neurological deficit. Hemorrhage due to trauma in arachnoid cysts has been well documented with either subdural or intraparenchymal hemorrhage. Subdural collection after rupture is not very common. They constitute, in some cases, a real neurosurgical emergency.

P-055

Central neurocytoma: A tumour in evolution

FB Maroun (St. John's), R Avery (St. John's), J Barron (St. John's), A Norman (St. John's), G Murray (St. John's), A Engelbrecht (St. John's), N Hache (St. John's)*

Background: Central neurocytomas are rare primary cerebral tumours. Prognosis is favourable if surgical resection can be achieved. The case of a man with a protracted history of a central neurocytoma is presented. *Methods:* A 52 year old male presented to hospital with a history of partial complex seizures dating to 1993. He was investigated with MRI, and found to have several subependymal nodules along the right temporal horn and trigone, consistent with either tuberous sclerosis or neurofibromatosis. A repeat MRI one year later showed stable disease. The patient was lost to follow-up, and presented to his family doctor in 2006 with cognitive decline and visual disturbance. MRI demonstrated a large lesion involving the right hemisphere, the left temporal lobe and caudate. Given the extensive disease, a limited resection was performed for diagnostic purposes. Pathological analysis was consistent with central neurocytoma. The patient was treated post-operatively with radiation therapy to prevent further cognitive decline. *Conclusion:* Central neurocytomas (WHO grade II) are considered relatively benign, with good prognosis if surgically resected. This case demonstrates for the first time the natural history of this lesion over a protracted period without intervention. It is suggested that long-term survival is possible without radical resection.

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P-056

Intracranial rhabdomyosarcoma metastasis: A case report

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Background: While intracranial metastases constitute the most common brain tumours encountered in clinical practice, cerebral metastatic disease from rhabdomyosarcoma is exceedingly rare. A case of an adult woman with a frontal metastatic rhabdomyosarcoma is discussed. *Methods:* A 61 year old woman presented in 2006 with a several week history of progressive personality change, memory disturbance and cognitive decline. She had a history of rhabdomyosarcoma of the right leg treated with an above knee amputation in 2001. She was diagnosed with right lung metastases in 2004 for which she had lobectomy, and was treated with radiation in 2005 for local recurrence. A CT of the head was performed, which revealed a densely enhancing left frontal tumour; MRI confirmed the presence of what was likely a metastatic tumour. She underwent an uncomplicated left frontal craniotomy and gross total resection of this lesion. Pathological analysis was consistent with a metastatic rhabdomyosarcoma, unchanged in comparison to the initial specimens. The patient's personality changes gradually resolved, and she was treated uneventfully with radiation therapy. *Conclusion:* Cerebral metastatic rhabdomyosarcoma is exceptionally rare, occurring in less than 2% of all cases. Most reports are from pediatric cases. For adults, resection of the metastatic tumour as per usual practice guidelines can achieve good results.

P-057

Intraoperative MRI verification of extent of resection in corpus callosotomy

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Background: Corpus callosotomy is an accepted procedure for palliative treatment of intractable epilepsy. However, the effective extent of resection has not been objectively delineated. The purpose of this study was to evaluate intraoperative magnetic resonance imaging (MRI) assessments of callosal resection with seizure outcome. *Methods:* Patients were considered for corpus callosotomy surgery if they had a predominance of drop attacks which were refractory to medical therapy. Charts were reviewed for age of onset, types of seizures, preoperative and postoperative frequency of seizures, imaging and complications. All procedures were performed by a single surgeon with intraoperative MRI guidance. *Results:* Ten patients underwent corpus callosotomy of which five underwent partial resections and five underwent total callosotomy. For those undergoing partial callosotomy, mean resection was found to be 71% resulting in 85% reduction of drop attacks. All patients who underwent total callosotomy, confirmed on intraoperative MRI, had >90% reduction in drop attacks. Mean follow-up was 8 months. Two patients suffered hemiparesis from cerebral infarctions, one venous one arterial. *Conclusions:* Intraoperative MRI is an effective tool to confirm the extent of resection in corpus callosotomy and ensures optimal seizure outcome. Partial corpus callosotomy of at least 70% is necessary to achieve good seizure outcome.

P-058

Ischemic white matter injury in kaolin-induced neonatal rat hydrocephalus

OH Khan (Winnipeg), MR Del Bigio (Winnipeg)*

Premature infant brains are highly susceptible to multiple neuropathological conditions ranging from hemorrhage to hypoxic-ischemic injury. Hydrocephalus is a common neurological condition that arises after germinal matrix / intraventricular hemorrhage. The primary target of injury is axons in the periventricular white matter. Experiments in mature animals systems indicate decreased white matter blood flow. We wished to characterize the molecular sequence of ischemia-related events resulting from neonatal-onset hydrocephalus. Sprague-Dawley rats underwent kaolin injection into the cisterna magna at postnatal day 1. They had enlarged ventricles by 7 days and severe dilatation by 21 days as assessed by magnetic resonance imaging (MRI) and histology. Periventricular white matter, including corpus callosum and internal capsule, was edematous at 7 days and severely atrophic at 21 days. ELISA and Western blots revealed decreased expression of myelin associated proteins including myelin basic protein. Pimonidazole hydrochloride (2-nitroimidazole) specifically binds to thiol groups of proteins, peptides and amino acids in hypoxic environments. Following subcutaneous administration, immunohistochemistry demonstrated hypoxia-associated adducts in periventricular glial cells. Nitrotyrosine, an oxidative stress marker, could be detected by immunohistochemistry extensively in white matter and around some blood vessels. Weak labeling was also seen around large neurons in cerebral cortex. VEGF immunohistochemistry revealed positive cortical neurons in normal 7-day old rats; this diminished at 21 days. The pattern of expression shifted to white matter glial cells in hydrocephalic rats. VEGF expression determined by ELISA supports those findings. In this model of neonatal kaolin induced hydrocephalus, hypoxia in white matter might contribute to the destructive changes. A decrease in oxygen saturation should lead to production of oxygen free radicals and activation of the transcription factor hypoxia inducible factor 1 alpha (HIF). HIF further activates a cascade of cellular responses, notably, vascular endothelial growth factor (VEGF). The main effect of VEGF is to cause production of new blood vessels. Its expression can have an influence on vascular permeability and could play a role in water dysregulation in the hydrocephalic brain.

P-059

Idiopathic orbital hemorrhage of extraocular muscle: case report and review of literature

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Background: Spontaneous orbital muscular hemorrhage is a rare event that may mimic other acute orbital or intracranial disorders. This report describes a patient with spontaneous orbital muscular hemorrhage and reviews the epidemiological, clinical and radiological characteristics of similar patients in the medical literature to reveal the prognosis and management strategies. *Methods:* Case report and review of the literature. *Results:* A 35-year-old male without medical history presented with an acute severe left orbital pain, blurred vision and ptosis associated with an otherwise normal neurological examination. CT-scan and MRI demonstrated a

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hematoma within the left inferior rectus muscle. No etiology was found. Complete recovery occured with conservative management. To our knowledge, there are only eleven other cases of idiopathic orbital hemorrhage related to an extraocular muscle and 72% of them involved the inferior rectus muscle. All patients recovered completely without surgical intervention. *Conclusion:* Spontaneous orbital muscular hemorrhage represents a benign condition and should be considered in the differential diagnosis of acute orbital pain particularly in the absence of underlying condition. Complete recovery and no recurrence is expected with conservative management.

P-060

Klippel Feil syndrome associated with a craniocervical dermoid cyst

N McLaughlin (Montreal), J Demers (Montreal), D Shedid (Montreal)*

Background: Klippel Feil syndrome (KFS) is characteried by a defect of segmentation of two or more cervical vertebrae. Rarely this is associated with an intracranial or spinal tumor. *Methods:* We present a case of KFS associated with a craniocervical dermoid cyst (DC) and review the literature. *Results:* A 47-yr-old female known to have KFS since her childhood, was referred for gait disturbances progressing over 2 months. Physical examination revealed a short neck, low hairline implantation and limited neck motion. Pyramidal signs and sensitive deficits were observed in both legs. Cervicothoracic radiography showed fusion of vertebral bodies at T6 without any movement documented on dynamic images. CT and MRI revealed a lesion expanding the craniocervical junction at T1, pushing the medulla inferiorly and the spinal cord antero-laterally. The tumor and its accompanying dermal sinus was completely resected through a posterior approach. Histopathlogy confirmed the suspected diagnosis of DC. Post-operatively, the patient progressively improved her gait. Including this patient, 19 cases of KFS associated with DC were described. *Conclusion:* The association between KFS and DC is perhaps not uncommon. Indeed, DC should be included in the congenital anomalies searched in patients with KFS given the possible contribution of mesodermal disturbances in both pathologies.

P-061

Sensorimotor behaviours are not adversely affected by chronic amphetamine administration in the rat model of Parkinson's disease

S Massoud (Halifax), D Sadi (Halifax), M Hong (Halifax), I Mendez (Halifax)*

Background: Fetal dopaminergic transplants have been studied as a treatment for Parkinson's disease (PD). In rat models of PD, amphetamine-induced rotational behavioural tests are used routinely to assess post-transplantation behavioural recovery. The aim of this study was to determine whether repeated amphetamine administration has deleterious effects on transplanted fetal cells or complex sensorimotor behaviours. *Methods:* Rats were rendered hemi-parkinsonian by unilateral administration of 6-hydroxydopamine. They received amphetamine 2 weeks post-lesion and at 2, 5, and 8 weeks post-transplantation of fetal rat dopaminergic neurons in the ipsilateral striatum. Control animals did not receive amphetamine. Forelimb function was assessed 2, 5, and 8 weeks post-transplantation and brain slices were analyzed histologically 9 weeks post-transplantation. *Results:* Behavioural performance did not differ significantly between amphetamine-treated and control animals on paw preference and skilled reaching tasks. Rotational behaviour did not increase in intensity with repeated exposure to amphetamine. *Conclusions:* Chronic amphetamine administration does not adversely affect behavioural performance in the hemi-parkinsonian rat. This confirms that amphetamine-induced rotation tests can be used adjunctively with other assessments of behavioural recovery in parkinsonian rats.

P-062

Angiographically-negative venous congestive myelopathy - case report

R Sahjpaul (Vancouver), B Toyota (Vancouver)*

Background: Venous congestive myelopathy (VCM) often results from impaired venous outflow secondary to a spinal arteriovenous fistula. Surgical or endovascular treatment can lead to substantial recovery. However, VCM can mimic neoplasia both clinically and radiologically and pose a diagnostic challenge. Rarely a biopsy is necessary to differentiate VCM from neoplasia if the neuroimaging fails to demonstrate an arteriovenous fistula. *Methods:* A 62 year old male presented with a 4 month history of painless progressive thoracic paraparesis. Magnetic resonance imaging revealed a diffuse enlargement of the thoracolumbar spinal cord with minimal enhancement. A spinal angiogram was negative, leading to a biopsy. *Results:* Pathological examination of the lesion revealed findings most suggestive of VCM (marked vessel hyalinization, decrease in axonal density, myelin loss, and reactive astrocytosis); no tumor was identified. An exhaustive search for a spinal vascular abnormality with a second spinal angiogram was negative. *Conclusions:* Venous congestive myelopathy can mimic neoplasia both clinically and radiologically, and can be a diagnostic challenge for the clinician and the pathologist. We present an unusual case of pathologically-proven VCM without being able to demonstrate a spinal vascular malformation, despite two spinal angiograms.

Movement Disorders

P-063

The protective effect of quercetin in an experimental model of Parkinson disease : a behavioral and histochemical analysis in adult rat

M Joghataei (Tehran), M Mehdizadeh (Tehran), R Aryanpour (Tehran), M Roghani (Tehran), M Nobakht (Tehran)*

Purpose: To determine the protective effect of quercetin in an experimental model of Parkinson disease. *Materials and Methods:* 80 rats from vistar spring were selected with weight 200 ~ 250 gr. Unilateral intrastriatal 6-OHDA (12.5 my/kg) were injected by stereotaxic method.

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Lesion rats were pretreated intraperitoneally with quercetin (20 mg/kg) 1 hour before and once a day with 10&20 mg dose, continued for one month post-surgery. Apomorphine-induced postlesion rotational behavioral tests were measured after one month.

After usage of agonist apomorphine, induction rotation was used during the fifth week after surgery as treatment efficiency indicator. SNC cell studied with method staning nissle. *Results:* Behavioral tests in the fifth week revealed that Apomorphine causes evident contralateral rotation in lesion group (P<0.01) and very low rotation in treatment group P<0.001) compared with sham group. Treatment group shows decrease in numbers of rotation (P<0.01) compared with lesion group. Treatment groups with 10, 20mg Quercetin observe any significant reduction. *Conclusion:* the number of CNC Left and right side neurons shows that There is no significant reduction between these, but in left side of Lesion (P< 0.001)and treatment (P<0.01) groups show significant reduction compared with right side, However reduction number in treatment groups in lower.

The behavioral and structural results indicated that short-term intraperitoneal administration of quercetin is effective as an antioxidant in therapy of early PD and may enhance the survival of nigral dopaminergic neurons. *Keywords:* Parkinson's disease, Antioxidant, Neuroprotective, neurotoxin; 6-Hydroxydopamine; Quercetin; Rat apomorphine.

Muscular Sclerosis

P-064

In pictures: multiple sclerosis - a neuroradiological review of its features and differential diagnoses

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Background: Multiple sclerosis is the most common disabling neurological condition in younger population. Diagnosis depends on a constellation of clinical and imaging findings, and no one test is sufficient. MRI is the imaging investigation of choice. Early and accurate diagnosis is essential for treatment with disease modifying therapies. *Methods:* We review our case records and recent literature articles to show typical and atypical MRI features of multiple sclerosis, use of recent developments in MRI for diagnosis including spectroscopy and diffusion tensor imaging, and tips for differentiating closely mimicking condition. *Results:* Typical and atypical presentations of multiple sclerosis including different types of MS are presented. Different imaging diagnostic criteria are described. Specific involvement pattern that helps to differentiate from common changes of microvascular ischemia are described. Other relevant differential diagnoses are shown. *Conclusion:* In our review, imaging features of MS are shown with an up-to-date literature review. Using these criteria, MRI could help an early and accurate diagnosis of multiple sclerosis and help patient's management.

P-065

Bilateral horizontal gaze palsy and severe trismus in multiple sclerosis: A case report

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Background: Bilateral horizontal gaze palsy (BHGP) and trismus have been rarely described with pontine infarction, glioma, brainstem abscess, paraneoplastic syndrome, pontine cavernous angioma and multiple sclerosis. *Methods:* We report a case of multiple sclerosis (MS) displaying BHGP and trismus. *Results:* A 26 year old woman with a previous history of MS developed BHGP, peripheral facial diplegia and bilateral trismus over a one week course. The trismus was severe enough so that patient was unable to eat or drink. Convergence and vertical gaze were preserved. A slight ataxia was also observed. Magnetic resonance imaging revealed four pontine hyperintense T2-weighted and FLAIR lesions in addition to multiple peri-ventricular and a juxta-cortical lesion, fullfilling Barkhof criteria. Intravenous steroids were given and the patient improved significantly over two weeks. *Conclusions:* Although rare, BHGP and severe trismus can be seen in MS and may respond to conventional treatment. Patients should be evaluated promptly to avoid denutrition and to investigate alternate diagnoses.

P-066

Skin changes in patients with relapsing-remitting multiple sclerosis on immunomodulatory therapy

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Objectives: To determine the frequency of skin changes (SC) due to current immunomodulatory therapy (IMT) used in the treatment of multiple sclerosis, to describe these changes, and to look at potential factors associated with increased or decreased risk of SC. *Methods:* Consecutive patients were recruited from the Calgary MS clinic during routine or skin problems visits. Consenting patients answered a questionnaire. Pictures were taken when skin lesions were visible. *Results:* Two-hundred and thirty-five patients were consecutively enrolled. The female to male ratio was 4:1 and mean age was 43.1 years. Sixty-one percent were on glatiramer acetate (GA) and thirty-nine on interferon- β(IFN-β). The most reported ISR was redness (85.1%) followed by tenderness (80%) and swelling (72.8%). Pain was most frequently reported by GA followed by IFNβ-1a. *Conclusions:* This study confirms that SC are frequent but self-limited in patients receiving IMT. Ninety-one percent of the patients didn't think that SC warranted discontinuation of the IMT. Fifty-percent reported resolution in 24 hours. Further analysis is underway to estimate the rates of lipoatrophy and necrosis based on objective assessment by nursing. Other variables related to patients, drugs, mode of administration and injection technique are also explored and will be further detailed in the presentation.

P-068

Salivary gland radiation therapy and its effects on the functioning of patients with amyotrophic lateral sclerosis (ALS): The retrospective basis for a prospective study

S Cleary (Edmonton), P Carey (Edmonton), N Jha (Edmonton), W Johnston (Edmonton), S Kalra (Edmonton)*

Background: Sialorrhea is a common symptom in ALS, leading to significant functional and psycho-social burden. Radiation therapy may improve sialorrhea, however its impact on other aspects of function has not been systematically evaluated. The purpose of this study was to conduct a retrospective review of patients who received radiation and design a prospective study in this area. *Methods:* The researchers conducted a retrospective chart review of patients with ALS who had received radiation therapy. Results were used to design a prospective study involving 10 patients with ALS and sialorrhea. *Results:* Six patients have undergone radiation therapy without serious adverse effects. Two required re-treatment and anti-sialorrhea drug dosing was reduced in 5 cases. Mild side effects included temporary decrease in taste (n=1), mild nausea (n=1), inflammation (n=1), and thrush (n=1). No reports of effects on swallowing were available. A prospective study was designed to evaluate saliva control, swallowing and eating ability two weeks prior to and six weeks after radiation treatment. *Conclusions:* Salivary gland radiation therapy appears to have beneficial effects on sialorrhea. Based on these data, a prospective study is being undertaken to further investigate the therapy's impact on saliva control, swallowing and quality of life.

NEUROMUSCULAR

P-069

Maximizing swallowing ability in ALS through increased sensory input: A case study

S Cleary (Edmonton), S Krawczyk (Edmonton), S Kizar (Edmonton), S Kalra (Edmonton), W Johnston (Edmonton)*

Background: Dysphagia is common in ALS. Behavioural treatment approaches for improving swallowing exist but have been little studied in ALS. One approach - increasing sensory input - may be particularly useful for these individuals who often have intact oral-pharyngeal sensation. We report a case to illustrate application of this treatment with an individual with ALS and cognitive impairment. *Methods:* A 77 year-old male, a retired chef, presented with severe dysphagia, rapid weight loss and complaints of lethargy and constipation, complicated by rejection of the modified diet. He was diagnosed with ALS, but refused a percutaneous gastrostomy tube placement. A sensory bolus enhancement program, in conjunction with a 'free water' protocol was developed (SC) and implemented by the patient's spouse. Outcome measures included calorie counts, weight, swallowing quality of life and caregiver quality of life. *Results:* The caregiver effectively implemented the program. The patient gained weight, reported increased energy, decreased constipation, and improved satisfaction with eating. The caregiver reported less frustration associated with the meals and nutrition. *Conclusions:* Results from this case study will form the basis for larger studies of the effects of sensory bolus enhancement in ALS, where active, progressive swallowing management programs may improve health-related outcomes.

P-070

Juvenile seronegative generalized myasthenia gravis- an atypical presentation

A Datta (Edmonton), H Kolski (Edmonton)*

Background: 15% of patients with myasthenia gravis (MG) are sero-negative. (SNMG). Thymectomy is a major treatment for MG and can result in clinical improvement. A unique case is presented which should alert physicians to different presentations and response to treatment in those with SNMG. *Methods:* We present a case of a 14 year old female with SNMG following a concussion. Her response to immunomodulatory therapy was poor. However, she had clinical remission following a thymectomy, despite normal pathology. Our case was analyzed in the context of the existing literature. *Results:* Our literature review suggests that trauma may play a role in SNMG. Abnormal thymic pathology is less commonly seen in SNMG, yet these patients respond as well to thymectomy as those who are sero-positive (SPMG). Interestingly, SPMG patients are more likely to respond to thymectomy with abnormal pathology. One can infer that normal pathology suggests a better response to thymectomy when the patient is sero-negative, likely related to differences in intra-thymic immune processes. *Conclusion:* SNMG patients may present uniquely. Although uncommon, there may be a history of trauma at the onset of symptomatology. Despite having a higher incidence of normal thymic pathology, these patients may respond to thymectomy. Pathophysiology and differing immune mechanisms between the SNMG and SPMG are discussed.

P-071

A supratentorial primitive neuroectodermal tumor (PNET) in an adult male

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Background: PNETs are unusual tumors in adults and are rarely supratentorial in location. However, since its therapy is different from that of more commonly seen tumors, PNET is an important diagnostic consideration. *Methods:* We present a case of a supratentorial PNET in an adult patient. Retrospective chart review was done for clinical details. MRI was obtained and a surgical specimen underwent neuropathological assessment. The pertinent literature was reviewed. *Results:* A 30 year old male patient presented with a one week history of headache, nausea and vomiting. Past medical history was unremarkable; physical examination was normal and neurological examination showed no focal deficit. MRI revealed a large, intra-axial, heterogeneously enhancing right frontal mass extending from the cortex to the periventricular area of the lateral ventricle's frontal horn. Craniotomy resulted in a pathological impression at frozen section of a small round blue cell tumor consistent with a lymphoma. However, final diagnosis was that of PNET and, therefore, subsequent gross total resection was performed. He is currently undergoing adjuvant chemo/radiation therapy. *Conclusion:* The supratentorial PNET is a rare tumor in adults, one that must be differentiated from other intra-axial high grade tumors.

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P-072

Recurrent intracranial germ cell tumor with diffuse white matter and optic nerve involvement

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Background: Intracranial germ cell tumors are extremely variable entities with respect to clinical presentation and imaging characteristics. *Methods:* Case Report. *Case Report:* A 34 year old man presented in 1999 with headache, nausea and vomiting due to a pineal mass. He was treated by complete resection. Neuropathological examination demonstrated an immature pineal teratoma. In 2005 he became with-drawn and had memory difficulties. Cranial magnetic resonance imaging (MRI) failed to show tumor recurrence. Areas of increased T2 signal were seen along the bodies of lateral ventricles and subcortical left temporal lobe. In 2006, he developed aphasia and visual decline, presenting to hospital in status epilepticus. On examination he had global aphasia, grossly diminished visual acuity, abnormal light reflex, optic disc pallor and skew deviation with diminished upgaze. MRI showed significant progression of the periventricular white matter lesions with enhancement in multiple sites, including a left temporoparietal deposit having a central hypointensity outlined by peripheral enhancement. A stereotactic brain biopsy revealed a germinoma, signifying recurrence of his germ cell tumor. *Conclusion:* Intracranial germ cell tumors, although commonly midline, can have variable clinical presentations depending on the site of involvement. This case illustrates that heterologous elements not noted with initial pathologic examination can emerge with recurrence, and have unusual patterns of spread. As described, diffuse infiltration of white matter and perioptic seeding can occur.

P-073

Defective dendritic cell maturation in malignant glioma patients

IF Parney (Calgary), J Rodrigues (Calgary), L Zhang (Calgary), G Gonzalez (Calgary)*

Purpose: Glioma patients are systemically immunosuppressed. We hypothesized that dendritic cell (DC) maturation defects may be partly responsible for this and that generating DC in vitro from malignant glioma patients' peripheral blood mononuclear cells (PBMC) would be more difficult than doing so from normal donor PBMC. *Methods:* PBMC from malignant glioma patients and normal donors (n = 10, each) were analyzed by flow cytometry for myeloid (CD11c+/HLA-DR+/Lin-) and plasmacytoid (CD123+/HLA-DR+/Lin-) DC precursors (Lin = CD3/CD14/CD19/CD56). DC were cultured from adherent PBMC in the presence of GM-CSF, IL-4, and TNF-alpha. At day 8, they were harvested and stained for class I and II MHC molecules (HLA-ABC, HLA-DR), T cell costimulatory molecules (B7-1, B7-2, CD40), and the DC maturation marker CD83. *Results:* Expressed as a percentage of Lin- cells, myeloid DC precursors were decreased in glioma patients compared with normal donors (mean ± sem = 6.6 ± 2.5% vs. 48.8 ± 4.2%, $P < 0.001$). Plasmacytoid DC precursors were similarly decreased (4.7 ± 1.9% vs. 22.2 ± 3.7%, $P < 0.01$). Data from DC maturation in vitro will be presented. *Conclusions:* Glioma patients have markedly reduced circulating DC precursors. This may contribute to immunosuppression in these patients and has important implications for glioma dendritic cell vaccine strategies utilizing autologous blood-derived DC.

P-074

Gliomatosis cerebri: a case report

L Ogieglo (Saskatoon), K Meguro (Saskatoon), S Hentschel (Saskatoon)*

Background: Gliomatosis cerebri is a rare entity characterized as a diffuse infiltration of the brain by neoplastic glial cells. This disease remains elusive to identify. We present a case with an unusual presentation, a failure of diagnosis and fatal outcome. *Methods:* A 50 year old female presented with a six month history of headache and a six day, intermittent history of diplopia. Magnetic resonance imaging revealed a T1 hypointense, nonenhancing lesion in the left frontal lobe with bilateral frontal lobe edema. Initial biopsy identified Grade III/IV malignant astrocytoma. Following a second operation for partial tumor resection, the patient died of malignant cerebral edema. Histopathological analysis of her brain revealed malignant astrocytoma, prominent cerebral edema and wide - spread infiltration of the astrocytic tumor cells suggesting gliomatosis cerebri. *Conclusions:* Gliomatosis cerebri is a diffuse infiltrating astrocytoma that remains difficult to diagnose despite advancements in neuroimaging. We report a case with tragic outcome following surgery and make recommendations for management.

P-075

Intracranial subependymomas: clinico-pathological characteristics

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Background: Subependymomas are benign lesions representing less than 0.7% of symptomatic cerebral tumours. The purpose of this study is to review our experience in order to define their clinico-pathological characteristics. *Methods:* A retrospective study of all proven subependymomas admitted between 1991 and 2006 at l'Hôpital Notre-Dame of the Centre Hospitalier de l'Université de Montréal. *Results:* This series of ten patients includes 4 women and 6 men with a mean age of 53 years-old. In three cases the tumour was sited in the lateral ventricle while 7 tumours were found in the fourth ventricle. When symptomatic, tumour of the lateral ventricles presented with hydrocephalus. However, fourth ventricle tumours had a more heterogeneous presentation with symptomatic hydrocephalus in only one case. Symptomatic tumours were approached by surgery with excellent outcome after a mean follow up of 34.5 months. These tumours are hypointense on T1WI and hyperintense on T2WI of MRI and may enhance after gadolinium injection. All tumours show benign histopathological characteristics with a predominant fibrillary pattern. *Conclusion:* Contrary to popular belief, symptomatic subependymomas of the fourth ventricle have a heteregenous clinical manifestation, presenting infrequently with symptomatic hydrocephalus. Excellent outcome is expected after surgical resection.

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P-076

Supratentorial Extra-Axial Ependymoma: Case Report

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Ependymomas at extra-ventricular locations constitute an uncommon but known entity. Of these, supratentorial extra-axial ependymomas are extremely rare. The authors present a case of a 14 year old Saudi boy with right frontotemporal extra-axial lesion which was initially thought to be a meningioma. The patient had had seizures, behavioral disturbances and deterioration in his vision for four years then. In addition, there was a relative right sided weakness. Craniotomy and complete excision of this highly vascular lesion was done. Frozen section reported it to be consistent with ependymoma. Clear extra-axial location of the lesion and a report of ependymoma on its final histopathology lead our pathology team to seek a second opinion which confirmed the diagnosis.
The authors have reviewed the available literature and could come up with only seven cases of supratentorial extra-axial ependymomas previously reported.

PEDIATRIC

P-077

Multiple short segment laminoplasties in children: a novel technique to avoid postoperative spinal deformity

P Steinbok (Vancouver)*

Introduction: Spinal deformity is a recognized important complication after laminectomies in children. Laminoplasties with laminar replacement were developed to try and prevent post-laminectomy deformity. Even with laminoplasties, spinal deformity is a concern, especially when laminoplasties involve multiple levels. The authors report a novel technique to avoid postoperative spinal deformity, using multiple short segment laminoplasties to access a long segment of the intraspinal space. *Report:* The technique was used to evacuate an organized extradural hematoma from C5 to T8 in a 9 months infant with incomplete quadriplegia. Three separate short segment superiorly reflected laminoplasties (C5-C7; T2-T4; T6-T8) were performed using the guarded attachment of a high speed drill, leaving intact laminae (T1;T5) between each laminoplasty flap. The three vascularized laminar flaps were replaced with absorbable sutures and the child braced externally for 6 months. At 1 year postoperatively there was complete neurological recovery and no spinal deformity. The laminae re-fused anatomically. *Conclusions:* Multiple short segment laminoplasties to access a long intraspinal segment may preserve stability of the spine, prevent spinal deformity and facilitate surgical stabilization should that be required. This technique may be applicable to other intraspinal lesions in children, such as tumours.

P-078

Long-term outcome of infants with positional occipital plagiocephaly

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Objective: To determine cosmetic and developmental outcomes at a minimum of five years of age in children diagnosed in infancy with positional plagiocephaly (PP) and the impact of cranial orthotic use. *Methods:* Questionnaire survey of parents of children diagnosed with PP in infancy. Retrospective chart review of consenting families and prospective follow up when families agreed to return for assessment. *Results:* Of 278 eligible children with PP, questionnaires were completed by 65 parents. Twenty-seven brought their child for reassessment. Participants and non-participants were similar. Median age of study patients was 8.8 years. Cranial orthoses were used in 18 of 66 children. Parents perceived cosmetic appearance of their child as "very abnormal" 2, "mildly abnormal" 25 and "normal" 38. Residual asymmetry was noted by parents in 58%, but only 21% were concerned about cosmetic appearance. In the last year, 7.7% of children commented about head asymmetry and 4.6% were teased occasionally. Fourteen percent were in a special class. Longer term outcomes, as perceived by the parent or child, were no different between children with and without orthosis use. *Conclusions:* The results allow better counselling of parents of infants with PP, reducing anxiety, and allowing more rational selection of management modality.

P-079

Posterior reversible encephalopathy syndrome in the pediatric population: the Montreal Children's Hospital experience

MG Ziller (Sherbrooke), B Rosenblatt (Montreal), C Poulin* (Montreal)*

Background: Posterior Reversible Encephalopathy Syndrome (PRES) has been described recently in adult patients. Typical features are headache, seizures and visual disturbances. Few descriptions of this syndrome and its clinical characteristics in pediatric patients have been published. *Methods:* We searched hospital and departmental records between 1995 and 2006 for patients compatible with PRES and analysed clinical, electrophysiological and radiological features. *Results:* We identified 7 patients with age ranging from 6-18 years. All patients presented with arterial hypertension (range 135-200 mmHg systolic, 65-120 diastolic). Clinical manifestations included seizures (n=5), headache (n=4), confusion (n=2), hemianopsia (n=1), visual hallucinations (n=1) and expressive aphasia (n=1). Underlying conditions were renal (focal glomerulosclerosis, lupus nephritis, vasculitis and immediate post-transplant period) and treatment of Acute Lymphocytic Leukemia (n=2). Patients were receiving calcineurin-inhibitors (n=2), cyclophosphamide (n=1) or intrathecal methotrexate (n=2). On MRI, all patients displayed abnormal T2/FLAIR hyperintensity in the posterior areas, but also in the frontal and temporal lobes, complicated by an intraparenchymal bleed and secondary ischemia in one patient. Symptoms resolved within 3 days to 2 months, but one patient died of multi-organ failure and one requires anticonvulsive treatment. *Conclusion:* Pediatric patients with PRES have severe underlying systemic conditions complicating

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diagnosis and treatment. MRI abnormalities can be found in the parieto-occipital regions, but also in frontal and temporal lobes. Intraparenchymal bleeding can complicate the clinical course. Treatment is antihypertensive and anticonvulsive. The clinical prognosis is generally favorable, but outcome may be affected by the underlying conditions.

P-080

Acute and long term neurological complications of bacterial meningitis in children

NJ Lowry (Saskatoon), ML Garner (Saskatoon)*

Background: This study was to determine the prevalence of acute and long term neurological complications of bacterial meningitis in children. *Methods:* A chart review of 45 children admitted with a diagnosis of bacterial meningitis. Long term follow up was determined by clinical visits, where possible, or telephone interviews. *Results:* Only patients with a positive cerebral spinal fluid (CSF) culture were included. The majority of the children were infected with *Streptococcus pneumoniae* 57.8% or *Hemophilus influenza* 28.9%.

A large number of the children had abnormal neuroimaging beyond the typical findings in bacterial meningitis. 21 patients had abnormal CT scans. 16 patients had a cerebrovascular accident during admission. 12 children had EEGs that were abnormal.

Acute complications included: prolonged fever, seizures and cerebritis. Long term follow up was available for 42 (93.3%) children. Of these 42 children, 13 reported no present neurological complications. 12 patients had hearing loss, 9 had developmental delay, 9 had a learning disability, 5 had motor deficits, and 2 developed epilepsy, 4 children died in hospital. *Conclusions:* Bacterial meningitis continues to have major morbidity. The majority of the long term neurological sequelae are due to CVA's suffered during the acute phase of the illness.

P-081

Adherence of children to MS disease modifying therapy

JK Mah (Calgary), LM Metz (Calgary), B Buckner (Calgary), J Bakker (Calgary), W Wall (Calgary), C Harris (Calgary)*

Background: We have shown that in our population based clinic adherence to MS disease modifying therapy (DMT) in adults with relapsing remitting MS decreased from 91% at 1 year to 66% at 5 years. The purpose of this study is to report adherence among children in our clinic. *Methods:* We capture age and DMT utilization data on all our clinic patients. All children with MS and suspected MS from Southern Alberta are followed in our clinic by a pediatric neurologist and an adult MS neurologist. We evaluated the rate of adherence to DMT in all patients that started DMT before age 18 by reviewing our database. *Results:* Seventeen children started DMT before age 18; 65% were girls. The mean age at first drug start date was 15.8 years (SD 2.0), with median disease duration of 13 months (IQR 10 - 24). First drug started was: 58.8% glatiramer acetate, 5.9% interferon beta-1b, 5.9% interferon beta-1a (i.m.), and 29.4% interferon beta-1a (s.c.). Eight (47%) children discontinued DMT after a median duration of 22 months (IQR 4 - 29.5). *Conclusions:* Children with MS are much more likely to discontinue DMT than adults. They require additional care to improve their adherence to treatment and health-related outcomes.

P-082

Adherence in children and adolescents with recurrent headache (RH) and chronic daily headache (CDH)

DF Phillips (Saskatoon), SS Seshia (Saskatoon), CL von Baeyer (Saskatoon), RJ Huntsman (Saskatoon)*

Background: Psychological issues are significant contributors to the development and maintenance of RH and CDH in children and adolescents. Nonadherence is common in those with headache (Rains et al 2006). Data in children are limited. *Methods:* A prospective and observational study of patients diagnosed with RH or CDH, referred by pediatric neurologists. Data were collected between February, 2004 and October, 2006. Psychological treatment was provided by a doctoral-level psychologist in a hospital-based outpatient health psychology clinic. *Results:* There was significant attrition from referral (n=55) through first appointment (n=31) to subsequent appointments (n=19). Of those attending a first appointment, there were 13 females and 1 male with CDH, and 13 females and 4 males with RH; age ranged from 8 to 17 years. In most cases the first appointment was a group meeting with 2 to 5 patients and their parents. For participants with pre- and post-treatment data available, trends suggest reductions in ratings of headache pain, headache frequency and missed school days. These findings cannot be generalized due to small n and lack of controls. *Conclusions:* Although psychological approaches to management of RH and CDH are effective, efforts must be made to study and improve adherence.

P-083

Occipital bone compression of the superior sagittal sinus as a contributory factor in neonatal cerebral sinovenous thrombosis

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Background: Cerebral sinovenous thrombosis (CSVT) causes neonatal brain injury. Supine newborns incur occipital bone compression of superior sagittal sinus (SSS). Resulting venous stasis could be an important, modifiable contributor to neonatal CSVT occurrence, propagation, treatment, and outcome. *Methods:* Neonates from the SickKids Children's Stroke Program(1992-2005) with confirmed CSVT and serial cerebral venous imaging were included. Patient data (perinatal factors, CSVT risks, treatment and outcomes) were analyzed. A neuroimaging scoring system (head position, parietal-occipital overlap, etc) was applied by 2 blinded investigators and validated. Risks for compression and effect on outcomes were explored using Chi-square, Mann-Whitney, and linear regression. *Results:* From the continuous cohort of 211 neonatal CSVT patients, 49 were included (76% male). Twenty patients (40%) had compression with reduction in SSS caliber ranging from 13-89%. Both degree of head flexion (p=0.006) and parietal-occipital bone overlap (p=0.0002) were strongly associated with compression. Sample size failed to demonstrate an association between compression and delivery mode, thrombus propagation, venous infarction, recanalization, or neurological outcome. Inter-rater reliability was high (ICC=0.93). *Conclusion:* Head position and

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parietal-occipital bone overlap influence SSS compression. Neck flexion should be avoided in neonates with, or at risk of, CSVT. Interventions alleviating compression may improve outcome in neonatal CSVT.

P-084

A pediatric neurology elective in the far north: a pilot experience

A Doja (Ottawa), H McMillan (Ottawa), P Jacob (Ottawa)*

Traditionally training in pediatric neurology has taken place in urban areas, most often at tertiary care centres. Because of the shortage of subspecialists in the Far North, larger centres often engage in outreach programs in these areas. The Children's Hospital of Eastern Ontario is involved in such a program, sending a neurologist to Iqaluit, Nunavut several times per year. This year, as part of a weeklong formal elective, a pediatric neurology trainee accompanied the consultant. A total of 27 patients were seen, 8 new and 19 in follow up. The most frequent presenting complaints were seizures, headache and developmental delay. Fifteen EEG's and 2 EMG/NCS were performed. The experience was felt to be valuable in demonstrating how to practice neurology in an area with limited resources. Additionally it allowed patients to be seen and treated in their native region, allowing for a greater understanding of the unique cultural and societal factors impacting their neurologic disease.

P-085

Congenital myotonic dystrophy: An update of the Canadian incidence and cohort study.

C Campbell (London), SL Venance (London), P Jacob (Ottawa), V Siu (London)*

Background: Congenital Myotonic Dystrophy (CDM) is the symptomatic manifestation of DM1 in a neonate. Much of the knowledge of the epidemiology, clinical features and outcome of CDM continue to be based on small, single centre case series. A national Canadian study has been initiated to address these issues. *Method:* The study is administered in two phases. The first part, started in March 2005, administered through the Canadian Pediatric Surveillance Program, is a prospective 3 year, monthly surveillance to identify incident cases of CDM. A case is defined as a genetic confirmation of DM1 in any child who has neonatal respiratory dysfunction or feeding intolerance. The second phase is a 5 year natural history cohort of incident cases examining mortality, morbidity, development and quality of life. *Results:* Two years of surveillance are complete with 48 cases reported and ten confirmed. Children were aged 24 days to 3 years when reported and six were the index cases for their family. Trinucleotide repeat number ranged from 700-2000. Two children died in the neonatal period. All children had feeding dysfunction with six requiring ventilation from 2-32 days. Of the six eligible cases, five have enrolled in the cohort study and have been followed for up to two years. *Conclusions:* The epidemiology, clinical features and outcome measures of CDM based on this population-based prospective cohort study will help to provide valuable information for families, health care providers and research efforts.

SPINE

P-086

Hemilaminectomy employment in removal of spinal cord tumors

Wm Sbeiti (Riad), A Zaki (Riad)*

Materials: 25 patients with tumors of vertebral canal and spinal cord were operated by hemilaminectomy. *Objectives:* With modern methods of preoperative diagnosis (CT,MRI) and neurosurgical techniques (microneurosurgery, special microinstruments) we can apply a much more economical and less traumatic approach of laminectomy. *Results:* Originally based possibilities of hemilaminectomy employment in removal of vertebral canal and spinal cord volume processes with different locations and histrostructure. Hemilaminectomy creates good possibilities for the removal of extramedullar and craniospinal neoplasm in the cervical, thoracic and lumbosacral parts of spines. The approach is enough for the decompression of the spinal cord in cases of intramedullar tumors, and suture or repair of the dura mater. Hemilaminectomy is the less traumatic and effective method, which retains anatomic structures of the spine and prevents instability and pathologic deformations of the vertebral column in remote postoperative period. Patients could be discharged from the hospital after suture removal.

P-087

Effects of degenerative disc disease on the cervical disc height

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Background: Degenerative disc disease (DDD) can cause loss of disc height and lordosis. The purpose of this *in vivo* retrospective study was to characterize the preoperative changes that occur with DDD and to examine how various cervical disc replacements impact postoperative disc height. *Methods:* Thirty-one patients underwent single level anterior cervical discectomy for treatment of cervical DDD producing radiculopathy and/or myelopathy. Lateral neutral radiographs were obtained preoperatively and at intervals up to 24 months postoperatively. Ten patients were treated with implantation of a ProDisc-C, 14 with a Bryan cervical disc and 7 with a standard fusion. Quantitative motion analysis software was used to measure the anterior disc height (ADH) and posterior disc height (PDH). Absolute values within groups were analyzed, together with measures of change within individual patients. *Results:* Preoperatively, the ADH approached the PDH at the surgical level (mean ADH 3.6mm, PDH 3.4mm, P=0.165). At the adjacent, non-diseased levels, there was a significant difference between the ADH and PDH (P<0.001, paired student t-test). Patients treated with a ProDisc-C showed a significant increase in disc height at the surgical level (mean preoperative ADH 3.3mm, PDH 3.2mm; early follow-up ADH 7.7mm, PDH 5.6mm; and late follow-up ADH 7.2mm, PDH 4.7mm, P<0.01). In patients undergoing Bryan disc insertion, there was a symmetric change in the ADH and PDH postoperatively (mean preoperative ADH 4.2mm, PDH 3.6mm; early follow-up ADH 6.0mm, PDH 6.3mm; late follow-up 6.0mm, PDH 6.0mm, P<0.01). *Conclusions:* DDD causes loss of disc height with the ADH

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approaching the PDH at the level of disease. Different cervical disc replacements have varying degrees of impact on postoperative disc height.

P-088

Anatomical differentiation between lamina of fourth and fifth lumbar vertebrae: diagnostic and clinical perspectives in lumbar spine surgeries

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Object: The purpose of this study is to determine the value of intraoperative clinical distinction between lumbar vertebrae, according to physical characteristics of the fourth and fifth lumbar vertebrae and to determine the statistical significance and the applicability of this physical distinction during lumbar spine surgeries. *Material and Methods:* This descriptive study covers 30 random cadavers autopsied to evaluate physical characteristics of fourth and fifth vertebral lamina and 200 patients undergoing a lumbar spine procedure to test the applicability of physical differentiation over a 2 year period from 2004 to 2006. The study was approved by the institutional review board (as a human subject not intruding patients' rights). Physical characteristics of lamina of the fourth and fifth lumbar vertebrae including height, length and thickness were measured in microscopic scales on autopsies and for each patient an intraoperative x-ray image was also taken. All the data were analyzed using Statistical Package for Social Sciences Release 11.5 software and two independent test was applied as the statistical test. *Conclusions:* The mean thickness of inferior border of L5 lamina is less than L4 lamina ($p<0.001$) and it is possible for the surgeon to differentiate these two vertebrae intraoperatively. Also a statistically significant difference was found between the mean height of L4 and L5 lamina ($P<0.000$). We also concluded that the mean length of L5 lamina is more than L4 lamina and the difference was statistically significant. We recommend a multinational research to evaluate the applicability of this finding in both genders and different races.

P-089

Bilateral transnasal endoscopic approach to the odontoid

BW Lo (Hamilton), A Lee (Hamilton), D Sommer (Hamilton), N Murty (Hamilton)*

Background: Transoral approach to the craniocervical junction is regarded as the accepted technique for odontoidectomy. With the advent of newer techniques, a possible role exists for a transnasal endoscopic approach to the odontoid process. *Methods:* Review of the literature reveals only one report of such approach. Previous cadaver feasibility studies are available. *Results:* We present a case of an 85 year-old male with a ten month history of progressive cervical myelopathy secondary to a rheumatoid pannus at the C1/2 junction. Bilateral endoscopic transnasal resection of the C1 arch, partial resection of the odontoid and rheumatoid pannus was performed with decompression of his cervicomedullary junction. Intraoperative stereotactic guidance was used. A subsequent decompressive C1/2 laminectomy was also performed with fusion and instrumentation from occiput to C5. Both procedures were tolerated well with clinical improvement to a point of ambulation with walkers at six month follow-up. *Conclusions:* Traditional transoral odontoidectomy often require tracheostomy and/or feeding tube placement. The transnasal route appears to obviate the need for such interventions. Although in its early stages, the transnasal endoscopic approach may offer a safe alternative. Larger clinical studies are necessary to further explore the risks and benefits of this procedure.

P-090

Distal spinal cord infarction simulating intramedullary tumour - a case report

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Background: Spinal cord strokes are diagnostic challenges, as they mimic neoplasms. They may be due to: (1) segmental arterial occlusion from atheroma, dissecting aneurysm, aortic surgery, degenerative disease of the spine, or (2) systemic hypotension. *Methods:* Review of the literature reveals that spinal cord strokes comprise about 1.2% of all strokes, with an annual incidence of 12 in 100 000. *Results:* We present a case of a 76-year-old male, vasculopath, who developed paraparesis with fecal incontinence after a lower extremity revascularization procedure. This patient underwent coronary artery bypass grafting and replacement of ascending aorta in August 2006. Subsequently, he underwent bilateral femoral-popliteal bypasses in December 2006, performed under epidural anesthesia. He developed conus medullaris syndrome after this procedure. His MRI revealed a hyperintense T2 lesion extending from T8 to the conus, with no restriction diffusion. Repeat MRI at one week showed slight improvement, consistent with evolving cord infarct. He was discharged in the same clinical state, with outpatient rehabilitation. *Conclusions:* The authors present a unique case of infarction of conus region. They speculate that temporary occlusion of the distal aorta during surgical manipulation most likely led to this patient's distal cord infarction by possibly causing occlusion of the artery of Adamkiewicz. Recovery from distal cord infarct is typically slow and incomplete.

P-091

Traumatic retroclival hematoma: an uncommon pediatric injury

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Background: Traumatic retroclival hematomas are quite uncommon. These lesions have been reported mostly in children. *Methods:* Two recent cases managed at our institution are reported and a literature review is presented. *Results:* An 8-year-old boy involved in a motor vehicle collision (MVC). Upon initial evaluation, he complained of neck pain. His neurological examination was normal. Imaging demonstrated an avulsion fracture of the tip of the odontoid process with a retroclival hematoma. The bony relationship between the atlas and occiput was normal, however craniocervical instability was suspected based on the imaging findings. He was managed with an external orthosis for 3 months. He recovered uneventfully.

The second patient is a 5-year-old girl who was also involved in an MVC. She presented with a depressed level of consciousness and quadriparesis. Imaging demonstrated a retroclival hematoma and atlantooccipital dislocation. She was treated with a posterior

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occipitocervical fusion. She had a prolonged convalescence, but her motor function gradually improved. *Conclusions:* Retroclival hematomas can be associated with severe injury to the ligamentous structures at the craniocervical junction and subsequent instability. MRI and CT of the craniocervical junction may be helpful when deciding whether to recommend internal fixation or immobilization with an external orthosis.

P-092

Unusual presentation of intramedullary post-traumatic syrinx

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Background: The pathophysiology of post-traumatic syringomyelia is not well understood. Several theories have been proposed. We present a case where a small post-traumatic syrinx rapidly evolved after intervention. *Methods:* A 47 year old woman was treated for a T9 fracture with paraplegia. After six months she was able to walk with crutches but with significant weakness and sensory changes. Approximately 13 years after her injury, she started developing progressive delayed post-traumatic myelopathy. Radiological investigations revealed a syrinx in the T7-T9 cord segments. Lysis of adhesions with syringosubarachnoid shunting was carried out, followed by syringopleural shunting after limited improvement. Despite this, there was increasing pain in the arms and progressive disability in the legs. MRI revealed an intramedullary high signal lesion expanding from the lower thoracic cord to C2. This was thought secondary to edema or myelitis. Follow up MRI a few weeks later revealed that this was now a syrinx communicating with the original site of injury. After re-exploration of her shunt the entire syrinx collapsed. *Conclusion:* The etiology of extensive edema above the original syrinx in the thoracic cord is unclear. It is possible that the edema may have preceded the formation of the syrinx. The rapidity with which the syrinx evolved is documented.

P-093

Intracranial hypotension due to Tarlov's cyst

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Background: Spontaneous intracranial hypotension in the absence of trauma or spinal puncture is often thought to be due to a spinal diverticulum located in the thoracic region. Association of this syndrome with a Tarlov (perineurial) cyst is very rare. *Methods:* A 47 year old presented with a three week history of persistent headache without any history of head trauma. The headaches occurred at the end of the day and were described as a pressure-like sensation in the frontal and occipital regions. The headaches were more pronounced in the sitting or standing position and were relieved partially when supine. The MRI revealed bilateral subdural hemorrhages with diffuse leptomeningeal enhancement and a moderate degree of tonsilar herniation. The thoracic and lumbar spine imaging revealed only bilateral S2 Tarlov cysts measuring approximately 1.4 cm in size. Over a period of a few months, the symptoms subsided without treatment. *Conclusion:* Intracranial hypotension is usually due to a CSF leak, either spontaneously, post surgical or traumatic. The spontaneous variety is usually due to a diverticulum of the thoracic area. Tarlov cyst rupture is rarely incriminated. We feel that the present case may have been due to such an occurrence of cyst rupture which healed spontaneously without surgical intervention.

P-094

Biomechanical evaluation of the Prestige™ cervical intervertebral disc prosthesis

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Background: Optimal cervical disc prosthesis design should duplicate the biomechanics of a healthy native disc. We characterize the in-vitro biomechanical properties of the Prestige™ cervical disc prosthesis. *Methods:* Range of motion (ROM), instantaneous axis of rotation (IAR), coupling pattern, and facet loads were characterized for 7 normal cadaveric cervical spines. These same parameters were quantified after the C4-C5 native disc was replaced with a Prestige cervical disc prosthesis. The normal and arthroplasty conditions were compared using two-tailed paired Student's t-tests. *Results:* At the surgical level, ROM during flexion-extension and axial rotation did not change significantly following insertion of the Prestige disc ($p>0.17$). Lateral bending ROM was significantly decreased following insertion of the Prestige disc (pre-operative 11.4 ± 4.2 degrees vs. post-operative 7.1 ± 4.4 degrees; $p=0.013$). After insertion of the Prestige disc at C4-C5, the coupling factor of lateral bending during axial rotation was significantly reduced ($P<0.001$). Relative to normal, the IAR during flexion-extension at C4-C5 moved anteriorly with the Prestige disc in place ($P=0.0163$). Strain on the left facet following insertion of the Prestige disc was increased during extension, flexion, right axial rotation, and right lateral bending ($p<0.05$). *Conclusions:* The Prestige artificial disc maintains ROM during flexion-extension and axial rotation and shifts the flexion-extension IAR anteriorly at the surgical level. Lateral bending ROM and lateral bending coupling during axial rotation are reduced relative to normal. Load transmission on the left facet is increased relative to normal.

P-095

Percutaneous placement of C1-2 trans-articular screws

M Nikolakis (Edmonton)*

Introduction: Fusion of C1-2 for atlanto-axial instability can be accomplished by several different open surgical methods. A purely percutaneous method of fusion has not previously been described. *Methods:* I sought to develop a percutaneous method of trans-articular screws and fusion of the C1-C2 joint. The surgical technique was developed on 2 human cadavers. *Results:* Successful placement of C1-2 trans-articular screws by a purely percutaneous method was achieved. CT scans of the cadavers verified correct placement of the screws. Dissection of the cadavers confirmed that no unwanted anatomical injury had occured. *Conclusions:* Purely percutaneous C1-2 fusion is possible from an anatomic perspective, as confirmed in human cadaveric experiments. Transition of this technique from the lab to the operating room is planned in the near future.

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P-096

In vivo kinematic results after ProDisc-C total disc replacement

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Background: The purpose of this prospective study was to assess whether the ProDisc-C preserved the kinematic parameters of the preoperative cervical spine. *Methods:* Fifteen patients underwent single level implantation of the ProDisc-C artificial cervical disc for treatment of cervical degenerative disc disease producing radiculopathy. Lateral neutral, flexion and extension cervical radiographs were obtained pre-operatively and at intervals up to 12 months post-operatively. Kinematic parameters including sagittal rotation, shear, change in disc height and center of rotation (COR) were determined for each spinal level. Within patient changes were analyzed using a paired student t-test. *Results:* Range of motion (ROM) was significantly increased at all operated spinal segments up to12 months following surgery (mean post-operative ROM 11.3 degrees vs. 6.6 degrees pre-operatively, $P = 0.0004$). However, global sagittal rotation (C2-7 ROM) did not change significantly (54.1 degrees vs. 50.2 degrees, $P = 0.11$). Disc height in the neutral position was significantly increased both anteriorly (6.0 mm vs. 2.9 mm, $P < 0.0001$) and posteriorly (4.8 mm vs. 2.9 mm, $P < 0.0001$). Changes in the COR between pre-op and late follow-up were greatest along the anterior-posterior axis of the vertebral body. *Conclusions:* The ProDisc-C provided *in vivo* functional spinal motion. There is a shift in the COR following disc replacement. The clinical implications of the biomechanical parameters will be discussed.

P-097

Grisel syndrome in adult patients. report of two cases and a review of the literature

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Background: Grisel's syndrome involves the subluxation of the atlanto-axial joint from inflammatory ligamentous laxity following an infectious process in the head or neck. It rarely occurs in adults and few adult cases were reported in the literature. *Method:* In this paper we report two cases of Grisel's syndrome in adults. *Result:* The first patient presented with C1-C2 instability after a tonsilopharyngitis. An immobilization with halo vest was tried but failed to restore stability. The second patient presented with C1-C2 instability associated with retropharyngeal abcess. The two patients underwent a C1-C2 fusion, with C1 lateral mass screw and a pars screw, with excellent results. The review of the literature includes the history, the definition, risk factors, pathophysiology, clinical presentation, radiological findings, classification, and treatment modalities. *Conclusion:* According to our experience and in the light of the literature, Grisel's syndrome is a rare disease that we should rule out in a patient presenting with neck pain with or without neurological deficit after upper respiratory tract infections. The recognition of Grisel's syndrome and early intervention is a critical factor for a successful outcome. Surgical treatment depends on the grade of the disease, the stability of C1-C2, and the response to medical therapy (antibiotics) and immobilization.

P-098

Case report: intramedullary neurosarcoidosis

S Gul (North Vancouver), R Sahjpaul (Vancouver)*

Case report: intramedullary neurosarcoidosis
Background: Spinal cord neurosarcoidosis is a rare diagnosis that may mimic tumour clinically and radiologically. *Clinical presentation:* A 57-year-old male presented with a 4-month history of bilateral upper extremity numbness and paresthesias, and bilateral spasticity in the lower extremities. An MR scan of the spine demonstrated a large intramedullary lesion from C4 to C7 with irregular foci of enhancement. No other manifestation of sarcoidosis was present. *Intervention:* The patient underwent an uncomplicated C5 to C7 laminectomy for subtotal microscopic removal of the intramedullary lesion using somatosensory evoked potential monitoring. A midline myelotomy was created and the lesion presented itself as a grayish, firm lesion that was adherent to the normal spinal cord. Histopathology revealed nodular collections of epithelioid and giant cells without evidence of necrosis or tubercle bacilli. *Conclusion:* Intramedullary neurosarcoidosis may be the only presentation of the disease in a patient. Intramedullary neurosarcoidosis can mimic the appearances of an intramedullary tumour on MR scanning and should be considered in the differential diagnosis of an intramedullary spinal cord tumour. Biopsy can help establish the diagnosis and may lead to a favourable outcome.

P-099

Case report: minimally invasive spinal instrumented fusion for trauma

S Gul (North Vancouver), R Sahjpaul (Vancouver)*

Case report: minimally invasive spinal instrumented fusion for trauma
Background: Spinal instrumented fusions using minimally invasive surgical techniques have proven to be safe and effective. We present a case in which minimally invasive spinal surgery techniques are used to achieve an instrumented fusion in a patient with acute trauma and unstable thoracic spine fracture. *Clinical presentation:* A 66-year-old lady presented acutely following a fall with severe thoracic spinal pain and without neurological injury. CT and MR scanning demonstrated a three-column flexion-distraction type injury of T11 with a retropulsed fragment of bone within the spinal canal and no evidence of spinal cord injury. *Intervention:* The patient underwent an uncomplicated T10 - T12 minimally invasive pedicle screw and rod thoracic instrumented fusion with deformity correction. *Conclusion:* Minimally invasive spinal instrumented fusion techniques can be utilized safely and effectively in certain patients with unstable thoracolumbar injuries. Minimally invasive spinal surgery reduces the significant muscle morbidity associated with conventional open spinal procedures.

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STROKE

P-100

Excellent treatment response in basilar thrombosis despite prolonged unconsciousness and brainstem radiological changes

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Background: Basilar artery thrombosis is associated with extremely high morbidity and mortality. Although it is recognized that early reperfusion improves outcome, contraindications to treatment are less clear. Many clinicians elect to withhold interventional therapy on the basis of extended periods of loss of consciousness and/or extensive MRI brainstem changes. *Methods:* We report a case of a 29 year old male who presented with a prolonged period of decreased level of consciousness, secondary to basilar thrombosis. *Results:* The patient presented initially with vertigo and ataxia, followed by confusion and decreasing level of consciousness over 36 hours. Intubation was required 30 hours after symptom onset. CT-head indicated bilateral cerebellar and pontine hypo-attenuation, and a hyperdense basilar artery. Intra-arterial treatment with r-tPA was attempted 6 hours after intubation. Partial basilar artery recanalization was achieved after 2 hours. An MRI scan 36 hours post-procedure revealed extensive edema throughout the pons. Despite the MRI appearance of infarction, the patient was extubated and discharged home with only residual dysarthria *Conclusion:* Prolonged unconsciousness and radiological appearances of infarction should not be considered a contraindication to reperfusion therapy in patients presenting with basilar thrombosis. In view of the natural history of this condition, intra-arterial therapy should be strongly considered in all such cases.

P-101

Intraprocedural carotid stent occlusion due to heparin-induced thrombocytopenia. A case study.

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Background: Heparin-induced thrombocytopenia (HIT) has been a rarely documented complication of stenting in different vascular beds. It has not been described in the stroke literature. We present a case of a 73 year-old woman with HIT syndrome complicating carotid stenting. *Methods/Clinical Course:* The patient presented with repeated TIA's referable to high-grade carotid stenosis despite maximal antiplatelet therapy. She was placed on an infusion of unfractionated heparin. Hospital conditions led to a prolonged stay of 15 days before a stenting procedure was initiated. Platelet counts stayed within the normal range but did drop by almost 50% by the day of the stenting procedure. A carotid stent was initially placed without complication. At the end of the procedure the patient developed weakness of her left arm and a M3 filling defect was noticed on angiogram. The stent then rapidly occluded. Intraarterial infusion of 18 mg of abciximab followed by 9 mg of tPA reopened the stent and the occluded M3 branch. *Results/Outcome:* ELISA and functional assays were positive for HIT. The patient was bridged to coumadin with the use of lepirudin. Plavix and ASA were continued. The patient sustained a small ipsilateral infarct with minimal clinical effect. *Conclusions:* Heparin exposure is common in patients awaiting carotid revascularization. The acute management and prevention of HIT is reviewed. Awareness of HIT may initiate the use of alternative anticoagulants in the peri-operative period to avoid this rare complication.

P-102

Effect of combined hypothermia and creatine on perinatal hypoxic-ischemic brain damage

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Introduction: Hypothermia is an effective post-ischemic neuroprotective therapy for neonatal hypoxia-ischemia (HI) injury. However, the effectiveness of hypothermia decreases as the severity of the insult increases. Thus the development of combination treatments is necessary to enhance hypothermia's neuroprotective benefits. A good candidate drug to combine with hypothermia should further enhance the physiological effects of hypothermia, have a mild side-effect profile, and be easy to administer. As creatine possesses such qualities, we investigated its co-treatment with hypothermia in moderate to severe HI injury. *Methods:* Post-Natal Day (PND) 7, Long-Evans rat pups were subject to unilateral common carotid artery ligation. Following a brief period of recovery, ligated rat pups were placed in hypoxia (8% oxygen) for 90 minutes followed by recovery in either hypothermic (28°C) or normothermic (37°C) environmental conditions for 24 hours, and infused with either glucose or a combination of glucose/creatine (3g/kg) solution. After the 24-hour temperature condition, pups were injected with creatine (3g/kg/day) or saline (0.9%) every 8 hours for 4 consecutive days. On PND 14, animals were sacrificed and brains were placed in a mixture of formaldehyde, acetic acid, and methanol (FAM) immediately following removal. Subsequently, brain damage was determined by rank scoring and determination of volumetric differences between the right and left hemispheres. *Results:* Creatine did not cause alterations in temperature compared to their non-creatine comparison controls. There was significantly less damage in the creatine-hypothermic group ($P<0.001$) and vehicle-hypothermic group ($P<0.05$) compared to control vehicle-normothermic animals. However, no statistically significant differences were found between the creatine-hypothermic and vehicle-hypothermic or creatine-normothermic and vehicle-normothermic groups. Differences between vehicle and creatine groups in both the normothermic and hypothermic conditions were non-significant. *Discussion:* Creatine combined with hypothermia and hypothermia alone both significantly reduced infarct volume associated with moderate HI injury compared to controls. However, combined treatment with creatine did not significantly decrease infarct size.

P-103

Unilateral critical carotid stenosis with bilateral manifestation: the shaking limbs TIA

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Background: Unilateral Limb shaking TIA is a rare but well recognized manifestation of carotid-occlusive disease resulting from cerebral hypoperfusion. Imaging studies usually demonstrate critical stenosis of the contralateral ICA correlating to this syndrome. Bilateral limb shaking secondary to significant unilateral carotid disease is unusual and only two cases of bilateral upper limb shaking TIA have been reported. *Case presentation:* A 75 year old male presented with shaking of all four limbs exclusively while standing or walking of 6 weeks duration. There was no alteration in level of consciousness. There were neither focal findings nor orthostatic hypotension. CT showed bilateral old subcortical lacunar infarcts. MRA with contrast revealed critical stenosis of the left ICA and mild stenosis of the right ICA. EEG showed no epileptiform potentials. The patient underwent urgent left carotid endarterectomy and remains symptom-free at three months follow up. *Discussion:* Contralateral limb shaking or abnormal movements are well described presentations of carotid-occlusive disease. To our knowledge this is the first case reported with shaking of all four limbs that completely resolved after the unilateral endarterectomy. *Conclusion:* We suggest that unilateral critical carotid disease should be considered as a possible cause of bilateral abnormal movements in an alert patient.

P-104

Lesion patterns and stroke mechanisms of isolated pontine infarcts

P Chung (Seoul), Y Kim (Seoul), H Moon (Seoul)*

Background: Association of infarct pattern and stroke mechanism of pontine infarct remain unknown. We evaluated the association of lesion pattern and stroke mechanism in patients with isolated pontine infarction. *Methods:* All patients had acute infarcts limited to pons. Topographic patterns of pontine infarct were classified as (1) anteromedial pontine infarct (2) anterolateral (3) tegmental (4) bilateral and (5) unilateral multiple infarct group.

Stroke mechanism was classified as (1) Large artery disease of vertebrobasilar artery (LAD) (2) Basilar artery branch disease (BABD) (3) Small vessel disease (SVD) (4) cardioembolism and (5) undetermined etiology. *Results :* 85 patients were investigated. In infarct pattern analysis, 56 patients (65.9%) showed anteromedial infarcts, 9 patients anterolateral infarct, 12 patients tegmental infarct, 3 patients bilateral infarcts and 5 patients had unilateral multiple infarcts. The main etiology of stroke was LAD in 37 patients, followed by BABD in 23 patients, SVD in 16 patients, undetermined in 9 patients. No patient was classified as cardioembolism. Anteromedial infarct was mostly related with LAD and BABD, and less frequently associated with SVD ($p=0.001$). Anterolateral and tegmental infarcts were often due to SVD ($p<0.05$). BA stenosis was not different among lesion patterns. *Conclusions:* Isolated pontine infarction in anterolateral and tegmental lesion are often caused by SVD. Anteromedial infarcts are mostly due to LAA and BABD. BA stenosis may not be a significant determinant of pontine infarct pattern.

P-105

A cool handed right hemispheric stroke.

G Jickling (Edmonton), M Mouradian (Edmonton), J Scozzafava (Edmonton), A Shuaib (Edmonton)*

A 51 year old female presented with left sided hemiplegia, a right gaze preference and a cool, pulseless right hand. A right middle cerebral artery ischemic stroke was diagnosed, and a conventional angiogram was obtained to investigate her ischemic right hand. She was found to have a blood clot in her brachiocephalic artery, which extended into her right carotid and right subclavian arteries. The optimal treatment for such an unusual thrombus was unclear. Options discussed include anticoagulation with associated hemorrhagic risk, intraarterial catheter clot extraction and surgical embolectomy. After careful discussion, a surgical embolectomy was performed and the patient regained function of her right hand. The etiology of the thrombus was suspected to be cardioembolic, however no cardiac source or hypercoaguable state was identified, including a search for malignancy.

P-106

How well is hyperlipidemia managed after ischemic stroke?

D Manawadu (Edmonton), AM Nasser (Edmonton), A Mateer (Edmonton), A Shuaib (Edmonton)*

Background: Hyperlipidemia is a risk factor for ischemic stroke. Detection and treatment of high lipid levels is needed to reduce further ischemic events. Management of hyperlipidemia is not always adequate. We report our practice regarding this. *Methods:* Data was collected on 76 consecutive patients admitted with an ischemic stroke. A previous history of hyperlipdemia, pre-admission lipid levels and prescription of statin drugs during admission was recorded. Patients were followed up and any repeat lipid levels documented. *Results:* 73% of patients had a pre-existing diagnosis of hyperlipidemia with 72% receiving treatment and one quarter reaching a target of 2.0 or less. All patients diagnosed with dyslipidemia during admission were prescribed statins. After discharge lipid batteries were available on 18 of the 44 patients residing within the area (41%). The mean LDL level was 2.17 with 6 patients achieving an LDL level of less than 2.0. *Conclusion:* Patients presenting acutely to our Stroke Service with ischemic stroke are treated with statins appropriately. However less than half are monitored over the following months and of these, only one third reach target. Huge improvements in monitoring LDL levels are needed with greater focus on adequate dosing to achieve the levels proving to have the greatest benefit.

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Treatment of acute ischemic stroke affected by time-related factors

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Background: Currently less than 5% of ischemic stroke patients are treated with tissue plasminogen activator (tPA), due to multiple factors. We studied which factors may delay arrival to hospital for thrombolysis. *Method:* Consecutive patients presenting with stroke symptoms at our hospital from March 2005 to December 2005 were included. Data collection was regarding time of onset, mode of transportation, patient's knowledge of stroke, and reasons for ineligibility. *Results:* Four hundred and one patients were included (202 males, 199 females), with a mean age of 70.77 ±14.2 years. There were 332 (83%) Ischemic strokes, 35 (9%) had a TIA and 34 (8%) an intracerebral hemorrhage. tPA was given to 59 (18%) of acute ischemic strokes. Reasons for not giving tPA included late arrival (56%), rapid improvement (14%) and unknown time of onset (8%). EMS bypassed a local hospital in 296 (74%) cases. Patient's awareness of stroke significantly correlated with early hospital arrival (97 vs. 142 minutes) and these patients were more likely to receive tPA (14% vs. 4%). *Conclusion:* Public education, EMS training, better communication between the ambulance service and ED/stroke team and diversion to designated centers are vital determining factors for speedy arrival and treatment of the acute stroke.

P-108

Emergency Medical Services (EMS) has an important role in tPA administration rate and acute stroke management

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Background: Delayed arrival to the emergency department (ED) is one of the major factors impacting the acute stroke treatment. In this study we sought to determine the role of EMS in increasing the rate of Thrombolysis after ischemic stroke. *Method:* We enrolled 401 consecutive patients presented to the ED with the signs and symptoms of stroke. Data was collected prospectively from the patients and EMS Forms. *Results:* Out of four hundred and one 332 (83%) patients presented with ischemic stroke. Fifty nine (18%) received IV tPA. All of them reached University of Alberta Hospital by EMS. None of the 24 (6%) patients who "self-presented" received tPA. EMS recognized stroke in (309)77% and bypassed nearby hospital in 287 (72%) cases to get the patient directly to our hospital. Thrombolysis was given to 13% arriving directly to the University Hospital Vs 5% re-routed from another hospital. Patients with TIA 35(9%) and ICH 34(8%) were excluded from the analyses. *Conclusion:* Stroke patients using EMS are more likely to receive tPA for ischemic stroke in comparison to those brought by a private transportation. Knowledge of the EMS about stroke symptoms and awareness about the designated center also increased the rate of Thrombolysis.

P-109

Caregiver burden following stroke: Identifying caregivers at risk

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Background: Caregiver burden following stroke is increasingly recognized as a significant health care concern. A growing number of studies have evaluated the patient, caregiver, and social support factors that contribute to increased caregiver burden. We conducted a systematic review of this literature to guide future research. *Methods:* A search of MEDLINE database (1980 to 2006) and study reference sections using a structured search strategy yielded 18 relevant articles. Studies were included if they evaluated predictors and/or correlates of caregiver burden in the setting of stroke. *Results:* The prevalence of caregiver burden was 25-54% and remained elevated for an indefinite period following stroke. In studies that evaluated the independent baseline predictors of subsequent caregiver burden, none of the factors reported were consistent across studies. In studies that assessed concurrent factors independently contributing to caregiver burden in the poststroke period, patient characteristics and social support factors were inconsistently reported. Several studies identified caregiver mental health and the amount of time and effort required of the caregiver as significant determinants of caregiver burden. *Conclusions:* Our findings highlight the need for more research to identify caregivers in need of support and guide the development and implementation of appropriate interventions to offset caregiver burden.

P-110

The prevalence of carotid intima media thickness in TIA or Stroke patients with and without metabolic syndrome

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Background: The Metabolic Syndrome (MetS) is a combination of multiple vascular risk factors and associated with increase risk of atherosclerosis and vascular diseases. Carotid intima media thickness (IMT) is sensitive indicator of atherosclerosis. We studied IMT in stroke or transient ischemic attack (TIA) patients with and without metabolic syndrome. *Methods:* The study was conducted at Stroke Prevention Clinic at the University of Alberta Hospital Patients with a diagnosis of TIA or stroke were included. Patient's demographic, clinical and biochemical characteristics were collected, and divided into two groups, one who met the diagnosis of MetS and control group. Ultrasound examinations were performed by Registered Vascular Technologist. IMT was measured by a single independent observer, blinded to subjects' vascular risks and compared in two groups. *Results:* 65 individual were included, 53(81%) were diagnosed with metabolic syndrome. 35(54%) were male, mean age 63years (range42-97). Mean IMT in Metabolic syndrome group 1.023mm (± 0.186) and in control group 0.917 mm (± 0.134). p= 0.13 *Conclusion:* There is no significant correlation between metabolic syndrome and IMT in patient with stroke or TIA, but there is a trend of increase IMT in MetS group. This needs to be tested in larger study group.

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P-111

Stroke out come scale

NH Rizvi (Edmonton), M Saqqur (Edmonton), A Shuaib (Edmonton)*

Objective: To assess the effect of stroke admission parameters on long term outcome measured by Modified Rankin scale.
Background: In acute stroke patients certain admission parameters are known to correlate with poor outcome. This study is an effort to quantify the effect of these parameter in stroke outcome. *Methods:* Patient admitted to stroke service at Uof A were noted for the following admission parameters, Clinical deficits in terms of motor deficits and cortical findings. Admission B.P. was monitored .We gathered data to see for any early improvement or deterioration as well as Labs findings such as glucose. These patients were followed up during hospitalization and Modified Rankin scale was done on day 7, 30 and 90.

At the end of 90 days the data was analyzed by logistic regression method. *Results:* Looking at mulit clinical , radiological and laboratory parameters. We found that Motor symptoms (absent, ...) is significantly associated with poor long term outcome (mRS>2). 10/13 (77%) with complete paralysis had poor outcome whereas 2/12 patients with no paralysis had poor outcome (P=0.008) There were no association between the other variables and outcome. *Conclusion:* This small study showed that initial motor deficits correlate best with long term modified Rankin scale. Other parameters such as cortical findings, BP Blood glucose and early progression did not show any significant bearing on stroke outcome. Part of the latter conclusion was related to small number of patients.

P-112

Real-time dynamic assessment of cerebral hemodynamics in a patient with orthostatic aphasia: a potential application of transcranial doppler

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Introduction: Intracranial atherosclerotic stenosis is thought to be responsible for 8% of all ischemic stroke subtypes. Transcranial Doppler (TCD) ultrasonography allows for noninvasive, dynamic evaluation of cerebral hemodynamics within the circle of Willis. We present a case of recurrent, orthostatic transient ischemic attacks in which, using TCD, we were able to correlate dynamically between the orthostatic symptomatology and a significant drop in the mean flow velocity (MFV) across the stenotic MCA segment. *Methods:* Case Report/Literature Review. *Case Discussion:* A 56 year old male presented recurrent episodes of orthostatic right sided weakness and expressive aphasia. Assessment of cerebral hemodynamics was performed using power-M Mode transcranial Doppler. A stenotic signal was recorded from the left proximal MCA, and a significant orthostatic drop in mean flow velocity (MFV) of 32 % was seen. Cerebral angiogram confirmed a high-grade stenosis at the supraclinoid segment of the left internal carotid artery. *Conclusion:* TCD is a useful, non-invasive, dynamic tool for assessment of the intracranial circulation and should be considered in the workup of patients with hypoperfusion cerebrovascular events.

Trauma, Critical Care

P-113

Management of severe traumatic brain injury in Saskatchewan

PA Mercier (Saskatoon), J Witt (Saskatoon), K Meguro (Saskatoon)*

Background: It has been suggested that early surgical intervention for patients suffering acute subdural hematoma can significantly reduce mortality rate. This study was undertaken to audit transport, treatment and outcome of severe traumatic brain injured patients to assess effects of delay of surgical treatment on outcomes for rural patients receiving treatment in Saskatoon. *Methods:* A retrospective chart review of severe traumatic brain injured patients (Glasgow coma scale <8) who had suffered either epidural or subdural hematomas was conducted. Patient transport history was noted and outcomes were graded using the Glasgow outcome scale from the last follow-up. *Results:* In total 49 patients were included in the study, 22 who suffered their injuries locally, and 27 from distant rural Saskatchewan. Although there were great differences in how long it took these patients to receive surgical assessment or treatment (averages 210 min. for local residents, 494 min. for rural residents) there was no statistically significant difference between the eventual outcomes of these patients. *Conclusions:* Although the delay in initiating neurosurgical treatment in patients from rural areas was alarmingly long, we could not detect a difference in eventual outcome compared local patients.

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Effect of troponin rise on outcome in patients with aneurismal subarachnoid hemorrhage

BW Lo (Hamilton), D Jichici (Hamilton), L Thabane (Hamilton)*

Background: In critically ill patients with aneurismal subarachnoid hemorrhage, cardiac troponin release represents a neurogenic form of myocardial injury. We explore the relationship between troponin rise and: (1) neurologic outcome (Rankin score), (2) prehospitalization use of statins, (3) history of coronary artery disease, (4) Hunt and Hess grade, (5) Fisher grade, and (6) anatomic localization of aneurysm. *Methods:* Retrospective analysis of Neuro ICU patients at the Hamilton General Hospital was conducted by two investigators (July 2003 - March 2006). Univariate analysis was used. *Results:* 36 of the 98 identified Neuro ICU patients with aneurismal subarachnoid hemorrhage experienced troponin rise. The presence of troponin rise was associated with increased mortality (p=0.0003). Hunt and Hess score is associated with troponin rise (p=0.0001); sensitivity 0.6, specificity 0.8. Fisher grade is also associated with troponin rise (p=0.02); sensitivity 0.85, specificity 0.6. Pre-hospitalization statin use, history of CAD and anatomic localization (R vs L) are not significantly associated with troponin rise. *Discussion:* Troponin rise is associated with poor neurologic outcome. Sensitivity and specificity analyses showed that 85% of patients with troponin rise have high Fisher grades, whereas 80% of those without troponin rise have low Hunt and Hess grades. Prior use of statins, prior CAD and specific anatomic location of aneurysms do not associate with troponin rise.

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42nd Annual Congress of the Canadian Neurological Sciences Federation PROGRAM

(subject to change)

Monday, June 18, 2007

09:00-12:00	CNSF Board Meeting
13:30-16:00	CNSF Board Meeting
12:00-13:30	CJNS Board Meeting

Tuesday, June 19, 2007

07:30-18:30	**Registration Open**
07:30-18:00	**Speaker Preparation**
08:00-17:00	**Neurobiology Review Course**
08:00-08:30	CJNS Audit Committee Meeting
08:30-09:00	CNSF Audit Committee Meeting
08:30-17:00	**ALS Strategies for Quality of Life/Quality Care Symposium**
08:30-17:00	**Child Neurology Day - Controversies and Advances in Neonatal Neurology**
09:00-11:00	CNSF Professional Development Committee Meeting
10:00-12:00	CNSF Scientific Program Committee Meeting
12:00-13:00	CSCN EMG Committee Meeting
13:00-14:00	CSCN EEG Committee Meeting
13:00-14:00	CJNS Editorial Board Meeting
14:00-15:00	CJNS Publications Committee Meeting
16:30-18:00	CSCN Council Meeting
16:30-18:00	CNSS Council Meeting
16:30-18:00	CNS Council Meeting
18:00-20:00	**Epilepsy Video Session**
18:00-20:00	**Movement Disorders Management: Drugs to Surgery**
18:00-20:00	**SPECIAL INTEREST GROUPS (SIGS)**
	ALS, Neuromuscular, Neurosurgery Residents' Education, Undergraduate Neurological Education

Wednesday, June 20, 2007

07:30-18:30	**Registration Open**
07:00-18:00	**Speaker Preparation**
07:00-08:20	**Stroke Satellite Symposium: TBC**
08:30-10:30	**Grand Opening Plenary: Scientific and Technical Advances in the Clinical Neurosciences**
10:45-12:15	**Chair's Select Plenary Presentation**
12:30-14:00	**Stroke Satellite Symposium: An Hemispheric Shift: The Changing Paradigm of Intracerebral Hemorrhage**
12:30-14:00	**MS Satellite Symposium: New Horizons in the Treatment of Multiple Sclerosis: A Focus on Selective Adhesion Molecule Inhibitors**
14:00-17:30	**Neuropathic Pain: Pathophysiology, Prevention and Management**
14:00-17:30	**Spine Course - Movement Disorders and the Myelopathic Patient**
14:00-17:30	**Clinical Electromyography Course**
14:00-17:30	**Neurocritical Care Course**
14:00-17:30	**Epilepsy Course: Intractable Epilepsy**
14:00-17:30	**Stroke Course**
17:30-19:00	Exhibitors' Reception / Digital Poster Viewing
19:00-21:00	Presidents' Reception

Thursday, June 21, 2007

07:00-18:30	**Registration Open**
07:30-18:00	**Speaker Preparation**
07:00-08:20	**Neuropathic Pain Satellite Symposium: Challenging the Current Paradigm**
08:30-10:00	**Plenary Session: CNS, CACN and CSCN Neurology**
08:30-10:00	**Plenary Session: CNSS Neurosurgery**
10:15-12:30	**Platform Sessions (6 concurrent)**
12:30-14:00	**Lunch / Digital Poster and Exhibit Viewing**
14:00-16:30	**Platform Sessions (7 concurrent)**
16:30-18:00	**Digital Poster and Exhibit Viewing**
18:00-19:00	Residents' Soirée
19:00	Presidents' Dinner

Friday, June 22, 2007

07:00-13:30	**Registration Open**
07:30-18:00	**Speaker Preparation**
07:00-08:30	CSCN Annual General Meeting
07:00-08:30	CNSS Annual General Meeting
07:00-08:30	CNS Annual General Meeting
07:30-08:30	Canadian Headache Society AGM
08:30-09:30	**Distinguished Guest Lecturer**
09:30-09:50	**The CBANHC Report**
09:50-10:15	**Digital Poster and Exhibit Viewing**
10:15-12:00	**Grand Rounds**
12:00-13:30	**Lunch / Digital Poster and Exhibit Viewing**
13:30-17:00	**Headache Course**
13:30-17:00	**What's New in Neurosurgery?**
13:30-17:00	**EEG Course**
13:30-17:00	**Dementia Course**
13:30-17:00	**MS Course**
13:30-17:00	**What's New in Neurology?**
13:30-17:00	**Neuromuscular Course**

Saturday, June 23, 2007

08:00-09:30	ThinkFirst Canada Annual General Meeting - Winterlake Room, Sutton Place Hotel
09:30-12:30	ThinkFirst Canada Chapters Meeting - Winterlake Room, Sutton Place Hotel

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