Volume 33 Number 2 (Supplement 1) May 2006

41st MEETING OF THE

Canadian Congress of Neurological Sciences

MONTREAL, QUEBEC JUNE 13-17, 2006

ABSTRACTS AND PROGRAM

The Canadian Journal of Neurological Sciences does not assume any responsibility or liability for any errors in the abstracts.

Canadian Congress of Neurological Sciences
709 – 7015 Macleod Trail SW,
Calgary, AB Canada T2H 2K6
Tel: (403) 229-9544 • Fax: (403) 229-1661
E-mail: brains@ccns.org

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

Volume 33 Number 2 (Supplement 1) May 2006

THE CANADIAN JOURNAL OF Neurological Sciences

LE JOURNAL CANADIEN DES Sciences Neurologiques

We acknowledge the assistance of the Government of Canada through the Publications Assistance Program towards our mailing costs. Canada

The official journal of: / La Revue officielle de:

The Canadian Neurological Society
La Société Canadienne de Neurologie

The Canadian Neurosurgical Society
La Société Canadienne de Neurochirurgie

The Canadian Society of Clinical Neurophysiologists
La Société Canadienne de Neurophysiologie Clinique

The Canadian Association of Child Neurology
L'Association Canadienne de Neurologie Pédiatrique

The permanent secretariat for the four societies and the Canadian Congress of Neurological Sciences is at:
Le secrétariat des quatre associations et du Congrès Canadien des Sciences Neurologiques est situe en permanence à:
7015 Macleod Trail SW, Suite 709, Calgary AB, Canada T2H 2K6.

The Canadian Journal of Neurological Sciences is published quarterly. The annual subscription rate for Individuals are: C$85 (Canada), US$85 (USA), and US$90 (elsewhere). Subscription rates for Institutions are: C$95 (Canada), US$95 (USA), and US$100 (elsewhere). Resident, intern and student rates are available. See www.cjns.org for details. Single copies C$24 each plus postage and handling. All manuscripts and communications should be sent to: Canadian Journal of Neurological Sciences, P.O. Box 5456, Station A, Calgary, AB Canada T2H 1X8. Courier to: 709 - 7015 Macleod Trail SW, Calgary, AB Canada T2H 2K6. Telephone (403) 229-9575; Fax (403) 229-1661. E-mail: journal@cjns.org; Website: www.cjns.org

Mailed under Publications Mail Agreement no: 40007777; PAP Registration no: 09824. Postage paid at Calgary, Alberta. This journal is indexed by *Aquatic Sciences and Fisheries Abstracts, ASCA – Automatic Subject Citation Alert, Biological Abstracts, Chemical Abstracts, Current Advances in Ecological Sciences, Current Contents (Clinical Medicine and Life Sciences), Dent. Index, e-psyche, Exerpta Medica, Index Medicus, Industrial Science Review, INIS Atomindex, Inpharma, Journal Watch Neurology, International Abstracts in Biological Sciences, Laboratory Hazards Bulletin, Neurosciences Citation Index, Nutrition Abstracts, Nutrition Research Newsletter, Pharmaeconomics and Outcome News, Reactions Weekly, Referativnyi Zhurnal, Science Citation Index, Weed Abstracts*

Le Journal Canadien des Sciences Neurologiques est publié trimestriellement. L'abonnement annuel est de 85 $C (non-membres au Canada); 85 $É-U (Etats Unis) et 90 $É-U (ailleurs); l'abonnement annuel for pour les institutions est de 95 $C (non-membres au Canada); 95 $É-U (Etats Unis) et 100 $É-U (ailleurs); Internes, résidents, fellows pré et post doctoral voir www.cjns.org pour détails. Copie simple: 24 $C plus affranchissement et manutention. Toutes les communications et les manuscrits doivent être adressés à Journal Canadien des Sciences Neurologiques, P.O. Box 5456, Station A, Calgary, AB Canada T2H 1X8. Par courrier: 709 - 7015 Macleod Trail SW, Calgary, AB Canada T2H 2K6. Téléphone (403) 229-9575; Fax (403) 229-1661. E-mail journal@cjns.org; Website: www.cjns.org

Posté sous poste-publications: numéro de convention: 40007777; numéro d'enregistrement PAP 09824. Port payé à Calgary, Alberta. Le Journal est cité et indexé dans *Aquatic Sciences and Fisheries Abstracts, ASCA – Automatic Subject Citation Alert, Biological Abstracts, Chemical Abstracts, Current Advances in Ecological Sciences, Current Contents (Clinical Medicine and Life Sciences), Dent. Index, e-psyche, Exerpta Medica, Index Medicus, Industrial Science Review, INIS Atomindex, Inpharma, Journal Watch Neurology, International Abstracts in Biological Sciences, Laboratory Hazards Bulletin, Neurosciences Citation Index, Nutrition Abstracts, Nutrition Research Newsletter, Pharmaeconomics and Outcome News, Reactions Weekly, Referativnyi Zhurnal, Science Citation Index, Weed Abstracts.*

Advertising representative/Représentant de publicité:
Sally Gregg, Canadian Journal of Neurological Sciences
709 - 7015 Macleod Trail SW, Calgary, AB Canada T2H 2K6
Tel (403) 229-9575 Fax (403) 229-1661
E-mail: journal@cjns.org; Web Site: www.cjns.org

Printer/Imprimeur:
Sundog Printing Limited, 1311 Ninth Avenue SW, Calgary, Alberta T3C 0H9

ISSN 0317 - 1671

Canadian Congress of Neurological Sciences (CCNS)
Canadian Journal of Neurological Sciences (CJNS)
2005 – 2006 Board of Directors and Committee Chairs

The CCNS and CJNS would like to thank the 2005 – 2006 CCNS 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.

Mark Hamilton
- *CCNS Chair*
- *CJNS Chair*
- *CNSS President*

Andrew Kirk
- *CCNS Vice Chair*
- *CJNS Vice Chair*
- *CNS President*

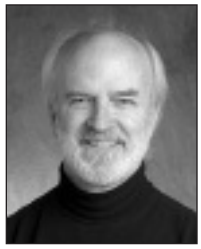
Garth Bray
- *CCNS Executive Vice-President*
- *CJNS Executive Vice-President - CNS*

Richard Desbiens
- *CCNS Audit Committee Chair*
- *CJNS Audit Committee Chair*
- *CNS Vice-President*

Ming Chan
- *CCNS Board Member*
- *CJNS Board Member*
- *CSCN Secretary-Treasurer*

Mary Connolly
- *CCNS Board Member*
- *CJNS Board Member*
- *CACN Secretary-Treasurer*

Joseph Dooley
- *CCNS Board Member*
- *CJNS Board Member*
- *CACN President*



George Elleker
- *CCNS Board Member*
- *CJNS Board Member*
- *CSCN President*

Derek Fewer
- *CCNS Board Member*
- *CJNS Board Member*
- *CNSS Vice-President*

J. Max Findlay
- *CCNS Board Member*
- *CJNS Board Member*
- *CNSS Secretary-Treasurer*

Manouchehr Javidan
- *CCNS Board Member*
- *CJNS Board Member*
- *CSCN Vice-President*

Lyle Weston
- *CCNS Board Member*
- *CJNS Board Member*
- *CNS Secretary-Treasurer*

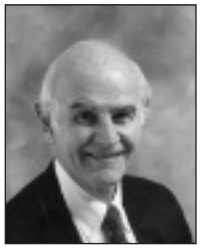
Colin Kazina
- *CCNS Residents' Representative*
- *CJNS Residents' Representative*
- *CNSS Residents' Representative*

Jerome Yager
- *CCNS Board Member*
- *CJNS Board Member*
- *CACN Vice-President*

Sue Brien
- *CCNS Professional Development Committee Chair - CNSS*

John Stewart
- *CCNS Scientific Program Committee Chair - CNS*

Noel Lowry
- *CJNS Publications Committee Chair - CACN*



Charles Tator
- *CBANHC Chair - CNSS*

Legend:	
CCNS	*Canadian Congress of Neurological Sciences*
CJNS	*Canadian Journal of Neurological Sciences*
CNS	*Canadian Neurological Society*
CNSS	*Canadian Neurosurgical Society*
CSCN	*Canadian Society of Clinical Neurophysiologists*
CACN	*Canadian Association of Child Neurology*
CBANHC	*Canadian Brain and Nerve Health Coalition*

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

41st MEETING OF THE

Canadian Congress of Neurological Sciences

MONTREAL, QUEBEC, JUNE 13-17, 2006

ABSTRACTS

SOCIETY PRIZE PRESENTATIONS

Canadian Association of Child Neurology – President's Prize
Canadian Neurological Society – Frances McNaughton Memorial Prize
Canadian Neurosurgical Society – K.G. McKenzie Prize in Basic Neuroscience Research
Canadian Neurosurgical Society – K.G. McKenzie Prize in Clinical Neuroscience Research
Canadian Neurological Society – Andre Barbeau Prize

PLATFORM PRESENTATIONS

Thursday, June 15, 2006

Friday, June 16, 2006

POSTER PRESENTATIONS

Wednesday, June 14, 2006 to Friday, June 16, 2006

Expert Led Poster Tours - Thursday, June 15, 2006 - 17:30 - 19:00

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

2005 Society Prize Papers

The President's Prize – Canadian Association of Child Neurology

Health-related quality of life among Canadians with migraine

PM Brna (Halifax), K Gordon (Halifax), J Dooley (Halifax)

Objective: To determine the impact of migraine on health-related quality of life (HRQOL) among Canadians. *Methods:* Canadian Community Health Survey (CCHS) collects information related to health status, health care utilization, and health determinants for Canadians. Analysis was based on the public use microdata set of the CCHS, Cycle 2.1, limited to age 15 and over residing in Manitoba. Respondents reported whether they had migraine, mood and/or anxiety disorders. HRQOL was measured using the SF-36 questionnaire which covers 8 domains related to functional status, well-being, and overall evaluation of health. Multivariate linear regression analysis was used to model each SF-36 scale against age, gender, education, income, migraine status and presence of mood or anxiety disorders. *Results:* CCHS was completed by 7236 respondents. 9.7% (95%CI 8.9,10.5) reported a diagnosis of migraine. Reported migraine predicted statistically significant ($p<0.0001$) lower scores in all SF-36 domains with profound impairment of physical role, bodily pain and general health. Those reporting a mood disorder (4.8%) scored significantly lower in all domains with pronounced effects on emotional role, social functioning and general health. Those with anxiety disorders (3.2%) scored significantly lower in 6/8 domains. *Conclusions:* Canadians with migraine report clinically and statistically significant impairment in HRQOL compared to the general population, independent of psychiatric morbidity.

Frances McNaughton Memorial Prize – Canadian Neurological Society

Smooth Ocular Pursuit in Spina Bifida and Chiari Type II Malformation

M Salman (Winnipeg), J Sharpe (Toronto), L Lillakas (Toronto), M Steinbach (Toronto), M Dennis (Toronto)*

Background: Chiari type II malformation (CII) is a congenital anomaly of the cerebellum and brainstem, both important structures for processing smooth ocular pursuit. CII is associated with spina bifida and hydrocephalus. We measured smooth ocular pursuit in CII, and investigated effects of spinal lesion level, shunt revisions, nystagmus, and brain dysmorphology on smooth pursuit. *Methods:* Smooth pursuit was recorded using an infrared eye tracker in 21 participants aged 8-19 years with CII. Thirty-eight healthy children constituted the control group. Participants followed a visual target moving sinusoidally at ±10º amplitude, horizontally and vertically at 0.25 or 0.5 Hz. *Results:* Smooth pursuit gains, the ratio of eye to target velocities, were subnormal in the CII group with nystagmus (N=8) but normal in the group without nystagmus (N=13). The number of shunt revisions, brain dysmorphology on MRI, or spinal lesion level did not correlate with smooth pursuit gains. *Conclusions:* Smooth pursuit is impaired in children with CII and nystagmus. Subnormal pursuit might be related to the CII dysgenesis or to remote effects of hydrocephalus. The lack of effect of shunt revisions and the subnormal tracking in subjects with nystagmus provide evidence that it is primarily related to the cerebellar and brainstem malformation.

K.G. McKenzie Prizes in Basic Neuroscience Research – Canadian Neurosurgical Society

p63 is an essential proapoptotic protein during neural development

W Jacobs (Toronto), F Miller (Toronto), D Kaplan (Toronto)*

Background: During development, the nervous system eliminates, via apoptosis, those neurons that do not successfully reach target connections. Following nervous system injury, apoptosis occurs as a mechanistic recapitulation of developmental neuronal apoptosis. A better understanding of this process will improve our ability to design neuroprotective therapeutics. Here, we define a proapoptotic role for the p53 family member, p63, during developmental neuronal death. *Methods:* To investigate p63 in apoptosis, cell biological and biochemical techniques were employed on mice with deletions of p63, p53, and Bax. *Results:* Sympathetic neurons express TAp63 during development, and TAp63 levels increase following NGF withdrawal. Overexpression of TAp63 causes apoptosis, while cultured p63-/- neurons are resistant to apoptosis following NGF withdrawal. p63-/- mice also display an in vivo deficit in sympathetic neuron death. While both TAp63 and p53 induce similar apoptotic proteins, TAp63 induces neuronal death in the absence of p53, but p53 requires p63 expression to promote apoptosis. *Conclusions:* In summary, we define a novel proapoptotic protein, TAp63, which is essential for developmental neuronal death. This model may extend to the injured nervous system, making p63 a novel target for neuroprotective strategies.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

2005 Society Prize Papers

K.G. McKenzie Prizes in Clinical Neuroscience Research – Canadian Neurosurgical Society

Validation of Objective Performance Measures During a Pedicle Cannulation Task

SI Woodrow (Toronto), A Dubrowski (Toronto), M Khokhotva (Toronto), D Backstein (Toronto), YR Rampersaud (Toronto), E Massicotte (Toronto)*

Introduction: There is increasing interest in developing assessment measures of surgical skills as indicators of surgical competence. The purpose of this study was to develop and validate a series of novel measures for use during a pedicle cannulation task. *Methodology:* Eleven novice and 7 expert spine surgeons cannulated a complete set of lumbar pedicles on a synthetic model. During the task, electromagnetic markers recorded their dominant hand and arm movements while the forces they applied to the model were measured using a force plate. The amount of wrist motion, mean forces, peak forces, torque and task time were evaluated. *Results:* Novice surgeons employed less mean force (94N versus 115N, $p<0.05$) and required more time to perform each cannulation task (12.4 versus 8.2 seconds, $p<0.05$). Pedicles cannulated by novices demonstrated a greater number of breaches (2.5 versus 0.5 per individual, $p < 0.05$), but no differences in the angles of cannulation were seen. *Conclusions:* Four variables can be employed to distinguish between novice and expert spine surgeons using a simple pedicle cannulation task, providing evidence of their construct validity. Knowledge of these differences may be useful in providing precise feedback during the training of this task, thereby enhancing learning.

Herbert Jasper Prize – Canadian Society of Clinical Neurophysiologists

Randomized controlled trial of post surgical electrical stimulation to promote nerve regeneration in carpal tunnel syndrome

N Amirjani (Winnipeg), K Chan (Edmonton), T Gordon (Edmonton), D Edwards (Edmonton), N Ashworth (Edmonton)*

Background: Electrical stimulation of peripheral nerves after crush injury and axotomy augments axonal regeneration in adult laboratory animals. However, the clinical applicability of this intervention has never been investigated in humans. The aim of this study was to test the effect of electrical stimulation on axonal regeneration after decompression surgery in carpal tunnel syndrome. *Methods:* In a randomized controlled trial, we investigated the effect of 1-hour continuous 20Hz electrical stimulation following decompression surgery on axonal regeneration of the median nerve, compared to decompression surgery only. Subjects were followed for one year at regular intervals. Motor unit number estimation (MUNE) was used to quantify the axonal regeneration. Additionally, sensory and motor nerve conduction studies, Purdue Pegboard Test, Semmes Weinstein Monofilaments, and Levine's Questionnaire were used to assess functional recovery. *Results:* The stimulation group had significant axonal regeneration 6-8 months after the procedure when the MUNE increased to 290±140 (Mean±SD) from 150±62 at baseline ($p<0.05$). In comparison, MUNE did not significantly improve in the control group ($p>0.2$). Sensory nerve conduction values significantly improved in the stimulation group earlier after the treatment than the controls. Terminal motor latency accelerated in the stimulation group but not in the control group ($p>0.1$). Other outcome measures showed a significant improvement in both groups. *Conclusion:* One-hour of continuous 20 Hz electrical stimulation of the median nerve following decompression surgery significantly augmented axonal regeneration. The procedure was feasible and well tolerated by subjects.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

Platform Presentations

Spine

A-01

Surgical decompression with postoperative radiotherapy versus radiotherapy alone in the palliative care of patients with metastatic spinal cord compression (MSCC): A cost-effectiveness analysis using Ontario-based health economic data

J Furlan (Toronto), K Chan (Kitchener), G Sandoval (Toronto), K Lam (Toronto), C Klinger (Toronto), R Patchell (Lexington), A Laporte (Toronto), M Fehlings (Toronto)*

Background: Patchell and colleagues (Lancet, 2005) demonstrated that combined decompressive surgery and radiotherapy (Sx+RDT) significantly improves patients' ability to walk and reduces analgesics and corticosteroids compared to RDT-only for metastatic spinal cord compression (MSCC). This study, for the first time, examines the cost-effectiveness and cost-utility ratios of both treatment options for MSCC patients. *Methods:* Baseline and probabilistic analyses were performed using costs for MSCC derived from the Ontario Case Costing Initiative. *Results:* The Sx+RDT strategy is more costly but also more effective than the RDT-only strategy with an incremental cost-effectiveness ratio (ICER) of $36,500 per life-year gained. The cost to gain one additional quality-adjusted life-year (QALY) is $44,000. The Monte-Carlo simulation revealed that ICER moves to the dominant quadrant in 25% of the times. Thus, by adopting the Sx+RDT strategy, there would also be a 25% chance of not paying extra for one additional QALY gained. *Conclusions:* Our results suggest that a change in the palliative treatment protocols for MSCC patients towards Sx+RDT strategy is more likely to increase health care costs. However, the gain in terms of patients' quality of life for such a dreaded clinical condition is relatively significant and should be taken into consideration by health care policy makers.

A-02

Spinal Deformities Following Selective Dorsal Rhizotomy

J Golan (Montreal), J Hall (Montreal), J Farmer (Montreal)*

Introduction: Selective dorsal rhizotomy (SDR) has been shown to provide considerable benefit to children with spastic cerebral palsy (CP). We sought to evaluate the risks of postoperative spinal deformities in patients following this procedure. *Methods:* All patients who underwent SDR at McGill between 1991 and 2001 were identified. Hospital charts, preoperative and the latest postoperative spinal radiographs were systematically reviewed. Univariate and multivariate analyses were carried out on all independent variables. *Results:* There were 98 patients with a mean age at surgery of 5.1 years and a mean radiographic follow-up of 5.8 years. Thirty-nine (44.8 %) patients with postoperative weight-bearing radiographs had scoliosis, 17 (32.1 %) patients with standing radiographs had hyperlordosis, and 18 (19.1 %) had spondylolisthesis. Statistical analysis identified CP severity as a significant factor; less ambulatory patients were more likely to have scoliotic curves and less likely to have lumbar lordosis. Younger age at surgery was also associated with a lower rate of lordosis. Spondylolisthesis only affected ambulatory children. None of the patients had clinically significant deficits. *Conclusions:* There is a high rate of radiological deformities in patients with CP who undergo SDR. Ambulatory function, CP severity, and age at surgery are significant factors to consider in patients before surgery.

A-03

The p75 neurotrophin receptor is essential to cell survival and improvement of functional recovery after spinal cord injury

G Chu (Toronto), M Fehlings (Toronto)*

Background: Apoptosis is involved after spinal cord injury (SCI). The p75 receptor has been implicated in the apoptotic cell death of neurons and glia, mainly in cell culture studies. A previous study noted that there is increased oligodendrocyte death distal to the injury site in p75 knockout mice after a partial transection injury. However, most human SCI are compression/contusion injuries, not transections. Therefore, we tested if a compression model of SCI would produce similar results. *Methods:* A compression injury of p75 knockout and wild type mice was created with a modified aneurysm clip. Western blotting for cleaved caspase-9, -8, -3, and -6 was performed. Spinal cord sections were stained for TUNEL and double stained for neurons, oligodendrocytes, and microglia/macrophages. Functional recovery of the knockout and wild type animals were assessed for 8 weeks after injury. *Results:* There were lower levels of cleaved caspase-9 but not caspase-8 in the knockouts, 3 days after injury. At 7 days, there was no difference in cleaved caspase-3 or -6 levels. There were more TUNEL positive cells at the injury site in knockouts (36.75 vs 12.13). Double staining showed more neuronal death in the knockouts. At 8 weeks after injury, the wild type group had higher Basso, Beattie, Bresnahan scores (8.75 vs 6.42). *Conclusion:* Surprisingly, the p75 receptor is necessary for improvement of functional recovery and increased neuronal survival at the injury site after a compressive SCI. The previous study noting increased oligodendrocyte death after transection may be highlighting the role of p75 in apoptosis in wallerian degeneration distal to the injury site. This study reflects the complexity of the p75 receptor. Cell survival or death may be dependent on type of injury, distance from injury site, and the type of cell involved.

A-04

Minimally invasive surgery for resection of thoracic intradural meningiomas using METRx tubular retractors

A Cenic (Hamilton), K Reddy (Hamilton)*

Background: Intradural meningiomas represent 25% of spinal cord tumors. The mainstay of treatment is gross total resection via

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

traditional open laminectomy. With the recent advances in minimal access surgery, many spine surgeons are using these approaches for degenerative spinal disease (e.g., laminectomy for spinal stenosis). In the available literature, no cases have been reported using tubular retractor systems in the resection of intradural spinal tumors. *Methods:* This report presents three intradural thoracic meningiomas resected in two patients using the minimally invasive microendoscopic METRx-Quadrant tubular retractors through small posterior paraspinal percutaneous incisions. *Results:* Both patients presented with lower extremity weakness and sensory deficits, and MRI verified the presence of intradural tumors. Patient A (85 year old female) had two thoracic tumors grossly resected at two different levels (T11 & T12) using two small posterior paraspinal incisions (2 cm in length each). Post-operatively, although the patient's hospital stay was extended due to medical co-morbidities, her leg function improved. Patient B (61 year old male) had a T8 intradural meningioma completely resected through a 2 cm posterior paraspinal incision, and was discharged home day after surgery with improving strength in his legs. In both patients, the dura was approximated with sutures through the tubular retractors without difficulty. There were no intraoperative complications. In both patient A and B, total blood loss was less than 350 ml and 250 ml, respectively. Both patients did not require PCA for pain control (i.e., minimal use of post-operative narcotics). *Conclusions:* We report on gross total resection of three intradural meningiomas using microendoscopic tubular retractor systems and discuss the utility of this technique as a possible alternative to the traditional open laminectomy. With such procedures, hospital stay may be shortened, intra-operative blood loss reduced, and post-operative narcotic use diminished.

A-05

Complication of Spinal Cord Stimulation: technical suggestions to improve outcome and financial impact

K Kumar (Regina), J Wilson (Regina)*

Background: The long-term success rates of Spinal Cord Stimulation are impeded by the high incidence of adverse events which impose a burden the health care budget. *Methods:* We performed a retrospective analysis of 160 patients enrolled in the previous 10 years. The total cost of each complication was obtained by summing across the healthcare resource headings in Canadian dollars at 2005 prices. Our advice to reduce complications is based on lab bench test data. Electrode fracture/displacement can be reduced by using the paramedian approach, using a three wing silicone anchor placed immediately at the place of exit of the lead to reduce the kink angle, avoidance of pulse generator placement in the gluteal area, avoidance of twist lock anchor to prevent crushing of the lead. Prophylactic antibiotics reduces the infection rate and trial stimulation reduces the rate of failed permanent implants. *Results:* Fifty-one adverse events occurred in 42 patients out of the 160 enrolled in this study. The mean cost of a complication over the ten-year study period was $7,092 with a range of $130 to $22,406. *Conclusion:* Complications not only disrupt the pain control effects but also, pose an added expense to the already high cost of the therapy.

A-06

Low-molecular-weight heparin and spontaneous spinal hematomas: case report and review of literature

B Lo (Hamilton), E Ling (Hamilton), N Murty (Hamilton)*

Background: Spontaneous spinal hematomas are a rare clinical entity. Several causes of spinal hematoma have been identified, including acquired and congenital clotting abnormalities and underlying vascular lesions. Low-molecular-weight heparin (enoxaparin) is one of the most widely used means of anticoagulation, for preventing and treating deep venous thrombosis. *Methods:* Review of existing literature identifies only five reported cases of spontaneous cases of spinal hematomas. Distinction between prevention and treatment doses of enoxaparin was not clearly made. *Results:* We present the case of a 68-year-old man who underwent T1-2 posterolateral decompression and laminectomy for resection of extradural metastatic prostatic cancer. Postoperatively, he regained his power in his lower extremities but developed deep venous thrombosis on preventive dose (1 mg/kg once daily) of enoxaparin. Under guidance of Thrombosis service, he was placed on treatment dose (1 mg/kg twice daily) of enoxaparin. Four days later, he developed a large subcutaneous and epidural hematoma at the surgical site. His acute paraparesis resolved after evacuation of epidural hematoma. *Conclusion:* It is our hope to raise awareness that preventive dosing of low-molecular-weight heparin may be inadequate in preventing DVT and treatment dosing of low-molecular-weight heparin may cause spontaneous spinal hematoma.

A-07

Using clinical decision analysis to assess the best treatment option for young patients with chronic neurogenic bowel dysfunction following cervical traumatic spinal cord injury (SCI)

J Furlan (Toronto), M Fehlings (Toronto)*

Background: Neurogenic bowel dysfunction following SCI is frequent and impacts patient's quality-of-life. For patients who fail primary clinical approaches, a second treatment option includes ileostomy, colostomy, Malone anterograde continence enema (MACE) and sacral anterior root stimulator (SARS). This clinical decision analysis examines the best treatment option for bowel care of young individuals with chronic refractory constipation after traumatic cervical SCI. *Methods:* Information from systematic reviews, utilities catalogs and a life table were used to build an analytical decision analysis comparing the four strategies. The quality-adjusted life expectancy (QALE) is the primary outcome. Baseline analysis, one-way sensitivity analysis, the "worst/best scenario" and probabilistic sensitivity analyses were performed. *Results:* Constipation refractory to clinical management occurs in 37%. Patients who undergo MACE have the highest QALE value compared to the other interventions. Sensitivity analyses confirmed the robustness of those results. The SARS appears to be the next treatment option, but probabilistic sensitivity analyses failed in confirming this suggestion. *Conclusions:* Our results suggest that the MACE has the best long-term outcome in terms of the probability of bowel function improvement, the complication rate, chance of

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

reducing autonomic dysreflexia episodes and patient's preferences. A randomized controlled trial comparing the MACE with the SARS could clarify the uncertainties of our model.

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.

Movement Disorders

B-01

The Broad Clinical Spectrum of Episodic Ataxia Type 2

P Adams (Vancouver), L Materek (Vancouver), P Lam (Vancouver), A Leung (Vancouver), B Szczygielski (Vancouver), S Spacey (Vancouver)*

Background: Episodic Ataxia type 2 (EA2) is characterized by attacks of ataxia lasting minutes to hours in duration. Attacks are typically triggered by exertion and start in childhood and adolescence. EA2 is an autosomal dominant condition resulting from mutations in the CACNA1A gene which codes for the α1A subunit of the P/Q type calcium channel. It is not known what percentage of patients with a classic EA2 phenotype have mutations in the CACNA1A gene, nor is the full spectrum of the EA2 phenotype known. It is the objective of this study to address these questions. *Methods:* 10 patients with episodic ataxia were screened for mutations in the CACNA1A gene by heteroduplex analysis and sequencing. 7 patients had a classic EA2 phenotype and 3 patients had episodic ataxia plus other atypical clinical features. *Results:* 3/7 patients with a classic EA2 phenotype had mutations in the CACNA1A gene. Two of these mutations had not previously been described. All of the patients with an atypical phenotype harboured mutations. *Conclusions:* 60% of the patients with episodic ataxia have mutations in the CACNA1A gene however the phenotype of EA2 is broader than originally thought and includes mental retardation and dystonia.

B-02

A new autosomal recessive spastic ataxia associated with a leukoencephalopathy

I Thiffault (Montreal), M Rioux (Sherbrooke), M Tetreault (Montreal), J Poirier (Montreal), J Mathieu (Jonquiere), M Vanasse (Montreal), J Lesage (Montreal), J Bouchard (Quebec), G Rouleau (Montreal), B Brais (Montreal)*

Background: Relying on a network of Ataxia and neuromuscular disorders clinics, we identified a group of 23 French-Canadian patients belonging to 17 families affected by an autosomal recessive spastic ataxia different from Friederiech and ARSACS. More than 50% of the families have a genealogical relationship with the Portneuf County. *Methods:* MRI, neurological examinations, genetic mapping, GWS and sequencing were used to uncover this putative French-Canadian founder effect. *Results:* All cases presented with cerebellar ataxia and spastic paraplegia. We observed a great intrafamilial and interfamilial variability, as illustrated by age of diagnosis, severity of phenotype and degree of white matter changes. The more severe cases have scoliosis, dystonia and cognitive impairment. Brain MRI show cerebellar atrophy, which may be associated with cortical atrophy, leukoencephalopathy and corpus callosum thinning. A genome-wide scan uncovered linkage of three families to one chromosomal region. Linkage analysis confirmed that all families are linked to this region (LOD score of 5.75). Haplotype analysis suggests that two common mutations may account for 95% carrier chromosomes. *Conclusion:* The uncovering of the ARSAL mutated gene may point to a common pathway for pyramidal and cerebellar degeneration as both are often observed in recessive ataxias and complicated paraplegias.

B-03

Prevalence of Pathological Gambling in Patients with Parkinson's Disease

C Lu (Calgary), A Bharmal (Calgary), S Kraft (Calgary), Z Kiss (Calgary), O Suchowersky (Calgary)*

Objective: To determine whether dopamine replacement therapy and/or deep brain stimulation (DBS) of either the subthalamic nucleus (STN) or pallidum is associated with an increased prevalence of pathological gambling in Parkinson's Disease (PD). *Background:* Pathological gambling is an impulse-control disorder with persistent maladaptive gambling behaviour that interferes with personal, family, or vocational pursuits. The rate of pathological gambling in the general Alberta population is 1.3%. Pathological gambling has been linked to both medical and surgical therapy in PD. *Methods:* A chart review of all patients currently followed by one neurologist (OS) combined with assessment of these patients attending clinic visits was performed. Patients were queried about gambling and data was gathered on type of PD therapy. Pathological gambling was defined according to DSM IV criteria. *Results:* 191 patients have

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

been surveyed with an overall prevalence of pathological gambling of 6% (11/191). 10% (7/72) were on pramipexole, 17% (5/30) on pergolide, and 17% (4/24) on ropinirole. 3 patients exhibited gambling on more than one agonist. No patients on levodopa (0/95) or bromocriptine (0/14) developed this problem. 3% (1/29) of surgery patients developed pathological gambling post-operatively; all had DBS of the STN. 32/191 of patients were infrequent gamblers before starting treatment. Of these, 11 became pathological gamblers. No patients who were non-gamblers before treatment developed pathological gambling with medication and/or surgery. *Conclusions:* Both dopamine agonist therapy and surgery are associated with an increased prevalence of pathological gambling in PD. Only patients who were gamblers prior to starting treatment developed pathological gambling. Levodopa monotherapy does not appear to increase risk of gambling. Physicians should query patients about gambling tendencies before initiating treatment and inform them of the potential risk with PD therapy.

B-04

Tyrosine hydroxylase and alpha-synuclein expression in acute rotenone toxicity

C Luo (Saskatoon), S Akhtar (Saskatoon), A Rajput (Saskatoon)*

Background: Rotenone is a systemic mitochondrial complex I inhibitor used to produce clinical and pathological features of Parkinson's disease (PD) in rats. At a dose of 3 mg/kg/day, nearly 40% of rats die within one week of rotenone exposure. PD markers in such animals are unknown. We studied the expression of tyrosine hydroxylase (TH), the rate limiting enzyme in dopamine biosynthesis, and alpha-synuclein (ASN), the major component of Lewy bodies, in acute rotenone toxicity. *Methods:* Male Lewis rats received continuous infusion of rotenone (n=6) at 3 mg/kg/day or placebo vehicle (n=10) dimethyl sulfoxide and polyethylene glycol (1:1) via subcutaneous osmotic minipump. Moribund rotenone treated rats were euthanized 5 days after infusion. TH and ASN proteins were assessed with immunohistochemistry and optical density quantified with Image-Pro Plus software. *Results:* Rotenone reduced the number of TH immunoreactive neurons in the substantia nigra pars compacta (SNc) ($p< 0.05$). TH level was increased in the striatum of rotenone treated rats, and ASN was increased in both the SNc and the striatum of rotenone treated rats ($p< 0.05$ for each comparison). *Conclusions:* Rotenone was acutely toxic to TH immunoreactive neurons in the SNc. It is unclear whether the upregulation of ASN serves a protective or harmful role in acute rotenone toxicity.

B-05

Saccadic Eye Velocity in patients of Spinocerebellar Ataxia Type 2.

L Velazquez-Perez (Holguin), C Seifried (Frankfurt), N Santos (Holguin), A Abele (Frankfurt), Z Ziemann (Frankfurt), E Góngora (Holguin), G Sánchez-Cruz (Holguin), J Rodríguez (Holguin), N Canales (Holguin), G Auburger (Frankfurt)*

Background: Progressive slowing of saccadic velocity is a very rare neurological condition, but has been described in SCA2. *Methods:* We investigated 110 patients from an SCA2 founder population, 70 non-symptomatic first-degree relatives and 107 controls for maximal saccade velocity (MSV) and studied its correlation to disease duration, polyglutamine expansion size, age at onset, ataxia score, age and sex. *Results:* The most important alterations were of two kinds: Firstly, a significant reduction of MSV in SCA2 was found for visually guided saccades of 10^o, 20^o, 30^o, 60^o amplitude, and even at earliest disease stages there was little overlap with normal values. Multivariate analysis with stepwise regression found 60o MSV to be influenced strongly by the expansion size, and still significantly by disease duration. This defect has been attributed to neuronal degeneration in the brainstem centers. Secondly, there are deficits in the higher-level control of these premotor centers, as in evident from increased latencies and difficulty in initiating appropriate saccades. *Conclusions:* The data suggest that saccade velocity is a sensitive objective SCA2 endophenotype, useful to search polyglutamine modifier genes similarly to the subjective age of onset. On the other hand, it has been claimed that saccadic eye movements dysfunction occur at a preclinical stage and could serve as an early marker of future SCA2 among the offspring of SCA2 patients.

B-06

Is neuropathy an iatrogenic complication of dopamine therapy in Parkinson's Disease?

M SuttonBrown (Calgary), S Furtado (Calgary), O Suchowersky (Calgary), D Zochodne (Calgary), C Toth (Calgary)*

Background: Recent evidence suggests that L-dopa therapy in Parkinson's Disease (PD) can lead to elevated homocysteine (Hcy) levels, possibly due to impaired catabolism of L-dopa by catechol-O-methyltransferase (COMT). Clinical complications resulting from this catabolic alteration remain uncertain. *Objective:* To identify patients with PD who have clinical and electrophysiological evidence of peripheral neuropathy (PN) and assess the fasting blood levels of cobalamin (Vitamin B12), methylmalonic acid (MMA), and Hcy within this population. *Methods:* Prospective identification of PD patients with PN occurred during a 30 month period in a tertiary care neurological center. PD Patients were assessed for clinical and electrophysiological evidence of PN. When no pathogenesis for PN was elucidated, assessment of fasting blood levels of cobalamin, MMA, and Hcy was completed. Control groups used for assessment included a group of PD patients without PN and a group of patients without PD with idiopathic PN. *Results:* Twenty-one PD patients with PN were identified, 18 (86%) of which had no identifiable cause of PN. Seventeen (94%) of these PD patients had elevated MMA and/or Hcy, and 50% of these patients had a depressed or low-normal fasting cobalamin level. One of 7 (14%) PD patients without PN had elevation of fasting MMA and/or Hcy. Only 11/119 (9%) patients without PD with otherwise idiopathic PN had abnormalities of fasting MMA, Hcy, or B12 levels. Although prolonged therapy with intramuscular vitamin B12 injections led to improvement of electrophysiological parameters in some PD patients with PN, no clinical improvement could be detected. *Conclusion:* Iatrogenic PN may occur in PD and contribute to accumulating gait impairment and disability. More detailed prevalence studies are planned. Preventative interventions such as COMT inhibitors and vitamin B12 prophylactic therapy may be useful in PD patients at risk for PN.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

B-07

Ventricular volumes and L-dopa non-responsive symptoms in Parkinson's disease

H Acharya (Edmonton), T Bouchard (Edmonton), R Camicioli (Edmonton)*

Background: Depletion of brain dopamine in Parkinson's disease (PD) has spawned treatment strategies which attempt to replete brain dopamine. Notably, however, speech, gait disorder, and postural reflex impairment do not respond to L-dopa and are termed dopamine non-responsive symptoms. These symptoms may be due to degeneration of non-dopaminergic neural circuitry. Age-related ventricular dilatation, associated with gait impairment, may contribute to dopamine non-responsive symptoms. *Methods:* Using gold standard volumetric MRI techniques, we measured ventricular volumes in patients with PD and age-matched healthy controls. The UPDRS was used to quantify dopamine responsive and non-responsive symptoms. *Results:* There were no demographic, gait or cognitive differences between groups. PD patients had higher UPDRS scores. PD and controls did not differ in ventricular volume. Within the PD group, age correlated with ventricular volume. When examined separately, dopamine non-responsive, but not responsive symptoms correlated with normalized total ventricular volumes in the PD group. Adjusting for age eliminated the association. *Conclusions:* These findings support the idea that age-related ventricular enlargement (reflecting central atrophy) in PD may be responsible for dopamine non-responsive symptoms of PD. Our data suggest that PD amplifies the motor effects of age-related changes related to central atrophy.

B-08

Analysis of Surgical Failures for Hemifacial Spasms at Re-Operation

A Kaufmann (Winnipeg), M Wilkinson (Winnipeg), J Nesbitt (Winnipeg)*

Introduction: Hemifacial Spasm (HFS) is a manifestation of facial nerve (FN) system hyperactivity caused by neurovascular compression (NVC). We achieve cure in 85-90% with microvascular decompression (MVD), and here examine failures of this surgery. *Methods:* Analysis of operative findings and outcomes was conducted for our patients undergoing "redo-MVD" for HFS. *Results:* Two groups of patients were identified: i) among our 126 undergoing MVD for HFS, 10 required redo MVD. No new NVC culprits were discovered. In 7 cases, the ectatic vertebral artery (5) or AICA loop (2) had shifted since the first surgery and could be more thoroughly mobilized using special MVD techniques with excellent results. The other 3 patients had no NVC and failed to improve; ii) six patients had prior MVD elsewhere, and where all found to have typical NVC that had not been identified or elevated at the prior surgery. Redo MVD provided excellent results in 5. Another had severe scarring related to the old implant material that hindered decompression attempts, resulting in persisting spasms, further hearing loss and a partial facial palsy. *Conclusions:* The success of MVD for HFS is dependent upon the adequacy of FN decompression, and cure should be achieved in the vast majority of patients. Failure to cure is only rarely (3/126) due to irreversible FN hyperactivity.

General Neurosurgery

C-01 *K.G. McKenzie Memorial Prize winner*
Clinical Neurosciences

Validation of Objective Performance Measures During a Pedicle Cannulation Task

S Woodrow (Toronto), A Dubrowski (Toronto), M Khokhotva (Toronto), D Backstein (Toronto), Y Rampersaud (Toronto), E Massicotte (Toronto)*

Introduction: There is increasing interest in developing assessment measures of surgical skills as indicators of surgical competence. The purpose of this study was to develop and validate a series of novel measures for use during a pedicle cannulation task. *Methodology:* Eleven novice and 7 expert spine surgeons cannulated a complete set of lumbar pedicles on a synthetic model. During the task, electromagnetic markers recorded their dominant hand and arm movements while the forces they applied to the model were measured using a force plate. The amount of wrist motion, mean forces, peak forces, torque and task time were evaluated. *Results:* Novice surgeons employed less mean force (94N versus 115N, $p<0.05$) and required more time to perform each cannulation task (12.4 versus 8.2 seconds, $p<0.05$). Pedicles cannulated by novices demonstrated a greater number of breaches (2.5 versus 0.5 per individual, $p < 0.05$), but no differences in the angles of cannulation were seen.*Conclusions:* Four variables can be employed to distinguish between novice and expert spine surgeons using a simple pedicle cannulation task, providing evidence of their construct validity. Knowledge of these differences may be useful in providing precise feedback during the training of this task, thereby enhancing learning.

C-02

Length of Tumour-Cochlear Nerve Contact and Hearing Outcome after Surgery for Vestibular Schwannoma

R Yong (Vancouver), B Westerberg (Vancouver), R Akagami (Vancouver)*

Background: Tumour size likely impacts the probability of hearing preservation after surgery for vestibular schwannoma. However, some series have not supported this concept, possibly due to variation in the technique used for tumour measurement. We sought to determine if the length of tumour-cochlear nerve contact was predictive of hearing outcome in adult patients undergoing resection of pathologically confirmed vestibular schwannoma. *Methods:* Patients who underwent hearing-preserving surgery for vestibular schwannoma at one institution by a neurosurgeon/neurotologist team between 2001 and 2005 were screened. Patients with AAO-HNS class A or B hearing preoperatively were included. Imaging was used to calculate the length of tumour-cochlear nerve contact, and measure the dimensions of the extracanalicular and intracanalicular components of each tumour. *Results:* Thirty-three patients were included, of whom 9 (27%) had hearing preservation. Length of tumour-cochlear nerve contact was significantly greater ($p=0.041$) in those who lost hearing (27.7 mm, 95% CI 23.8 mm - 31.6 mm) compared to those who did

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

not (20.7 mm, 95% CI 15.8 mm - 25.6 mm). The diameter of the extracanalicular component was similarly significantly greater (p=0.029, 20.3 mm [15.8 mm - 24.8 mm] vs. 12.6 mm [7.9 mm - 12.9 mm]). *Conclusion:* Vestibular schwannomas with greater lengths of tumour-cochlear nerve contact are at increased risk for hearing loss after surgery. Increased extracanalicular diameters also place patients at greater risk, a finding consistent with previous studies.

C-03

Percutanous CT guided radio-frequency ablation of the upper spinal cord pain pathways for cancer pain of the body and face

A Raslan (Vancouver)*

Background and aim of the study: To present the results of 51 consecutive cases of percutanous CT guided upper cervical cordotomy and trigeminal tractotomy for control of cancer pain involving the body and the face. *Methods:* Since 2000, 51 patients with cancer pain or cancer related pain in the body and/or face were treated with CT guided radiofrequency ablation of the spinothalamic tract or trigeminal tract-nucleus in the region of the upper cervical spinal cord, 41 patients underwent unilateral spinothalamic tractotomy and 10 patients underwent trigeminal tractotomy-nucleotomy. Pain was assessed directly and indirectly using postoperative pain level. VAS and total sleeping hours, the level of functionality of these patients was measured before and after the procedure using Karnofsky scale. *Results:* Initial 97% pain relief or excellent pain control initiallly that continue to 80% at 6 months follow up. *Conclusions:* CT guided ablation of the upper cervical spinal cord is safe and effective procedure for cancer pain, The CT guidance adds to the efficacy and safety profile of the cordotomy and trigeminal tractotomy-nucleotomy

C-04

Primary Endoscopic Management of Arachnoid Cysts

R Grondin (Calgary), W Hader (Calgary), S Myles (Calgary), M Hamilton (Calgary)*

Introduction: Endoscopic fenestration of intracranial arachnoid cysts is a well established treatment option for lesions causing mass effect. However, the success rate of such treatment is uncertain, and many authors advocate CSF-diversion as primary treatment. The purpose of this study was to evaluate the success rate of endoscopic fenestration and to determine its role as primary treatment of arachnoid cysts. *Methods:* The Neuroendoscopy Database of the University of Calgary was searched for patients presenting with symptomatic arachnoid cysts between 1994 and 2004. *Results:*Twenty-two patients were identified. There were 18 children and 4 adults (age range 0-62 years). Of these, 6 patients presented with malfunction of previously inserted shunts. The remaining patients presented with symptoms related to mass effect from their arachnoid cysts. Sixteen patients underwent endoscopic fenestration as primary treatment of their arachnoid cysts. Patients were then followed for a mean period of 5 years (range 0.3-10). Four of 10 patients who were treated by in the first year of life subsequently required insertion of either a cysto-peritoneal or ventriculo-peritoneal shunt. Of the 16 patients undergoing primary treatment by endoscopy, 10 remain shunt-free. *Conclusions:* Endoscopic fenestration is a relatively safe and effective first-line treatment for symptomatic arachnoid cysts, which may eliminate the need for long-term shunting in a majority of patients.

C-05

Endoscopic Pituitary Surgery with and without Image Guidance: an experimental comparison

J Gong (Montreal), G Mohr (Montreal), J Vézina (Montreal)*

Background: To assess the impact of image guidance on endoscopic pituitary surgery (EPS), we measured the accuracy of the system and compared some critical surgical steps with and without image guidance under experimental conditions in terms of efficiency and precision. *Methods:* Twenty cadever-heads were explored by standard EPS technique. System Accuracy, Actual Visual Accuracy were recorded. Some important anatomic parameters were measured in surgical field and on navigation system respectively and the differences were calculated and analyzed. Some critical surgical steps time were recorded and compared between with and without image guidance. *Results:* The System Accuracy showed a mean value of 0.28mm. The average value of Actual Visual Accuracy was1.53mm. The maximum difference between the measurements from the navigation system and from their actual visual counterparts was less than 7%. In normal anatomical conditioning, for the duration of ostium sphenoidale exposure and sellar window creation, there was no statistical difference between with and without image guidance, however, in anatomical variations, the surgical time showed to be significantly shorter when navigation was used. *Conclusion:* We have demonstrated in this experimental setting that the electro-magnetic tracking image guidance possesses a high accuracy at millimetric level and therefore provides precise localization and orientation in EPS. With the assistance of neuronavigation system, it is not only advantageous in saving operating time, but more importantly, in enhancing the orientation thus rendering surgeries safer and more efficient.

C-06

Post-operative neurosurgical infections due to proprionibacterium acnes

F Maroun (St. John's), G Murray (St. John's), J Hutchinson (St. John's), R Avery (St. John's), A Engelbrecht (St. John's)*

Background: Proprionibacterium acnes (P.Acnes) is a common inhabitant of normal skin particularly present within the sebaceous glands of the scalp and is considered as an uncommon pathogen in post-operative infections. However, serious neurosurgical complications have been reported. *Methods:* A review of 21 cases of post-operative neurosurgical infections due to P.Acnes seen over a period of 10 year was carried out. Variable parameters such as interval time between surgery and occurrence of infection, location and type of lesion and associated prosthetic material such as synthetic graft and shunt tubing were analysed. *Results:* There were 17 brain tumours (9 gliomas, 8 meningiomas), one aneurysm, two VP shunts

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

and one post traumatic. Dural grafts were performed in 16 cases (9 with galea and 7 with allodura). 11 patients had post-operative radiation. The most common site of infection involved the incision, the subgaleal and mainly the epidural space. All patients were treated with surgery and antibiotics. There was no mortality or significant morbidity and all patients demonstrated no further recurrence of infection. *Conclusions:* P.Acnes is evolving as a major cause of post-operative neurosurgical infections. Unusual features such as late onset, predilection to the epidural space should be investigated.

C-07

The role of retrograde repression in limiting axonal regeneration in the central nervous system

A Wu (Saskatoon), D Fourney (Saskatoon), D Schreyer (Saskatoon)*

Background: The expression of growth associated proteins (GAPs) is necessary for axonal regeneration, and appears to be retrogradely inhibited by FGF-2 at the axon target site. Regrowth occurs if this inhibitory signal is interrupted by injury. Regeneration after injury may fail in CNS neurons because retrograde inhibition is maintained by multiple local and distal axons. *Methods:* Transcallosal neurons in rats were labeled with a fluorescent marker, and retrograde inhibition simultaneously interrupted at both distal and local axon target sites with bilateral infusions of a function blocking antibody to FGF-2. GAP expression was quantified after seven days using in-situ hybridization of GAP-43 mRNA. *Results:* GAP-43 expression in animals infused with antibody was 7.9 +/- 5.0 % per labeled neuron, compared to 4.7 +/- 2.2% in control animals infused with buffered saline. Total GAP-43 expression in local cortex was 26.8 +/- 11.1% per high power field (63x) in the experimental animals, and 2.9 +/- 0.5% in controls. *Conclusions:* Simultaneously interrupting retrograde inhibition at both local and distal axon sites increased GAP expression both in the local cortex as a whole, and in individually labeled transcallosal neurons.

C-08

Where Are We Headed in Academic Neurosurgery in North America? : A Comparative Study of Trends in Canadian and US Academic Neurosurgical Centers

D Chang (Sacramento)*

Background: Declining reimbursements, increasing overhead, increasing medical-legal liability, reduction of available neurosurgical manpower, reduction in resident work hours, increasing medical student debt, decreased funds available for academic efforts, and increased restrictions on clinical research, such as HIPAA, are some of the changes of recent times that have challenged the structural integrity of United States academic neurosurgery. Consequently, the traditional missions of research, teaching, and service have been eroded creating an environment in which many US academic neurosurgery departments find themselves in an increasingly unfavorable position to advance these goals. The findings of an inquiry of US academic neurosurgeons were presented at the October 2005 Congress of Neurological Surgeons meeting suggesting significant structral problems compromising the ability of US departments to realize their stated missions. Canadian medicine historically has had marked similarities and important differences that distinguish it from the US model. The objectives of this study are: 1) to present a comparative analysis of trends affecting academic neurosurgery in Canada and the United States and 2) to identify potential solutions or systems design changes that may benefit both systems. *Methods:* Confidential e-mail questionnaires were sent to all academic neurosurgeons in Canada. The query covers the gamut of academic neurosurgical practice, including demographics, practice content, research and teaching activity, career expectations in academia, institutional promotions criteria, and suggestions to improve the current situation. A literature review on academic practice models is presented. *Results:* Final results of the Canadian portion of this study are not available, but will be presented at the CCNS annual meeting in Montreal in June 2006. *Conclusions:* While research and subspecialization are the cornerstone of a successful academic career, the practical difference between US academic practice and private neurosurgical practice is unclear in the current era. A comparative study of trends affecting academic neurosurgery in Canada and the US can shed important light on optimizing the operational success of both systems in realizing the original purported missions of academic medicine.

STROKE

D-01

Room for improvement: a nine-year experience of stroke thrombolysis at a Canadian teaching hospital

J Reid (Halifax), J Jarrett (Halifax), C Christian (Halifax), S Phillips (Halifax), G Gubitz (Halifax)*

Background: Tissue plasminogen activator (t-PA) given for acute ischemic stroke (AIS) reduces death and disability; use is often limited by the 3 hour time window. *Methods:* We interrogated a prospective AIS registry and reviewed charts of all t-PA treated patients at Halifax Infirmary between May 1996 and May 2005. *Results:* 153 patients were given t-PA for AIS (7.0% of all AIS patients). Patients treated with t-PA were more likely to be male (64% vs 51%, p=0.03), have atrial fibrillation (27% vs 18%, p=0.005), higher stroke severity scores (7.7 ± 1.4 vs 6.2 ± 1.9, p<0.00001) and in-hospital mortality (23% vs 14% p=0.005) than other AIS patients. Rates of t-PA use did not change over time. The percentage of AIS patients presenting within 3 hours of symptom onset rose from 36% (1996-2000) to 40% (2001-2005; p=0.04); time from CT scan to treatment increased (57±26min vs 68±28min p=0.03); however, mean onset to treatment time did not change (163±27min vs 161±33min, p=0.5). *Conclusions:* Despite more AIS patients presenting within 3 hours, the proportion of eligible patients receiving t-PA has not increased; symptom onset to treatment times have not improved. These data underscore the need for further improvements in the delivery of t-PA.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

D-02

Amount of physiotherapy and occupational therapy for hospitalized ischemic stroke patients

S Seung (Toronto), N Mittmann (Toronto), D Gladstone (Toronto), S Hassan (Toronto)*

Background: The amount of rehabilitation therapy is a determinant of stroke recovery. A Canadian expert consensus panel recently recommended a minimum of 2 hours of therapy per day. Methods: We conducted a retrospective database analysis of ischemic stroke patients admitted to a university teaching hospital in Toronto, Ontario (July 2003-June 2004). Patient identifiers were used to search an allied health professional database (INFOMED) to quantify the total number of physiotherapy (PT) and occupational therapy (OT). Results: There were 222 ischemic stroke admissions (mean age 76 years and 47% male). Fifty-four percent (119/222) of cases had a modified Rankin score≥3. The mean length of hospital stay was 17.2±7.5 days. Sixty-nine percent (154/222) received PT and 62% (138/222) received OT assessments and/or therapy in hospital. A total of 776 hours of PT and 534 hours of OT was provided, averaging to 5.0±5.3 hours and 3.9±2.4 hours per patient, respectively. Conclusions: In this sample, hospitalized ischemic stroke patients received an average of 1 hour of PT over 3.4 days and 1 hour of OT over 4.4 days which falls below current recommendations. These results should prompt hospitals to monitor the duration, frequency and intensity of rehabilitation services provided to stroke patients.

D-03

The Economic Burden of Ischemic Stroke Study ("BURST"): preliminary clinical data

N Mittmann (Toronto), S Seung (Toronto), M Sharma (Ottawa), D Gladstone (Toronto), P Bailey (Saint John), S Phillips (Halifax), A Shuaib (Edmonton), M Hill (Calgary), A Liovas (Mississauga)*

Background: Canada lacks comprehensive, accurate, up-to-date data on the direct and indirect costs of stroke. Methods: A cohort (N=200) of ischemic stroke patients will be recruited in a consecutive manner at sites across Canada (N=10). Baseline, 3-month and 6-month questionnaires will be completed by each patient to capture information about stroke severity (National Institutes of Health Stroke Scale [NIHSS]), treatment, functional impairment (Barthel Index [BI] and modified Rankin Scale [MRS]), depression, utility and resource utilization. Results: As of January 5th 2006, five (Toronto, Calgary, Edmonton, Halifax and Saint John) sites had consented 20 patients for the baseline questionnaire: 75% were male and the average age was 64.7±14.1 years (range 27-86 years). Co-morbidities included hypertension (70%), hyperlipidemia (60%), diabetes (50%) and atrial fibrillation (20%). Median NIHSS score was 4 (4-18) and 50% of patients had MRS≤2 at time of discharge. Acute inpatient rehabilitation was the discharge destination for 45% of patients. Conclusions: Preliminary results are presented for 10% of the study sample size. The BURST study is ongoing. Interim results (resource utilization and overall costs of treating ischemic stroke) will be available in summer 2006.

D-04

Utilization, relevance and economics of cardiovascular investigations in an ambulatory stroke clinic

N Pageau (Mississauga), S Medic (Mississauga), A Douen (Mississauga)*

Background: Since ~ 15-20% of ischemic stroke are thought to be due to cardioembolism, cardiovascular investigations are often routinely requested in these patients. *Objective:* Evaluate the utilization, relevance and economics of cardiovascular investigations in an ambulatory stroke prevention clinic (SPC). *Methods:* We reviewed 538 SPC charts from Jan-April, 2005. Patients with non-specific symptoms or those felt to be due to other causes were eliminated. Only those patients diagnosed with stroke/TIA (n = 200) by the attending neurologist were studied. ECG and Holter monitor were felt to be relevant if they showed atrial fibrillation/flutter (a-fib). Cardiac ECHO was assessed for those factors that might alter secondary stroke prevention and included identification of thrombus, poor LV function (Grade 3,4), PFO/ASD. Results: Only 26.5% had preexsisting coronary artery disease (CAD). ECHO ($232.60/case) and Holter ($105.95/case) were performed in 142 (71%) and 148 (74%) of cases, respectively, for a total cost of $48,709. Significant ECHO findings were identified in 6 (4%) patients, which did not alter antithrombotic therapy. Four of these patients had preexisting CAD. Holter identified 2 cases of a-fib, which were present on the initial ECG. Conclusions: Routine investigation of ambulatory stroke/TIA patients with ECHO and Holter appear to be costly and low yield procedures. A prospective study may be useful for further assessment of these observations.

D-05

Missed opportunities for stroke prevention in atrial fibrillation: A provincial population-based audit

E Bui (Toronto), M Kapral (Toronto), J Fang (Toronto), P Lindsay (Toronto), F Silver (Toronto), J Tu (Toronto), D Gladstone (Toronto)*

Background: Warfarin is effective for stroke prevention in individuals with atrial fibrillation (AF), yet it is underused. Updated Canadian population-based data are needed to assess the magnitude of this problem. *Methods:* The Ontario Stroke Audit (part of the Registry of the Canadian Stroke Network) investigated a random sample of 1,580 acute ischemic stroke patients from 151 hospitals (April 2002-March 2003). We selected a subgroup with: (1) known non-valvular AF; (2) additional risk factors (1 high-risk or 2 moderate-risk) for systemic emboli; and (3) no known contraindications to anticoagulation. Primary endpoints were pre-stroke medications and admission international normalized ratio (INR). *Results:* Among AF patients with a first ischemic stroke (primary prevention cohort, n=80), strokes were disabling in 61% (discharge Rankin ≥ 2) and fatal in 23%. Preadmission medications were: warfarin (35%); single antiplatelet (31%); dual antiplatelet (0%); no antithrombotic (34%). Of those taking warfarin, 80% were subtherapeutic (INR < 2.0) at the time of stroke admission; median INR 1.5. Overall, only 7% of AF patients were taking warfarin with INR ≥ 2.0 at admission. In patients with a previous TIA or ischemic stroke (secondary prevention cohort, n=49), only 26% were taking

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

warfarin with therapeutic INR at admission and 31% were taking warfarin with subtherapeutic INR. *Conclusions:* At the time of ischemic stroke, most patients with AF (who are candidates for anticoagulation) either are not taking wafarin or are subtherapeutic. This major knowledge-practice gap should encourage greater efforts to prescribe and monitor anticoagulation to reduce stroke/death risk in individuals with AF.

D-06

A prospective study of crossed cerebellar diaschisis in hemispheric stroke

A Gao (Toronto), D Gladstone (Toronto), F Leibovitch (Toronto), J Lawrence (Toronto), L Ehrlich (Toronto), C Caldwell (Toronto), S Black* (Toronto)*

Background: The concept of diaschisis proposes that brain damage not only has functional effects locally, but also remotely in interconnected areas. Crossed cerebellar diaschisis (CCD) refers to reduced cerebellar function contralateral to a hemispheric lesion. This study determined clinical and lesion correlates, and prognostic significance of CCD in hemispheric stroke. *Methods*: In 284 consecutive stroke patients, clinical and imaging data were collected acutely (0-7 days), subacutely (8-60 days) and at 1 year. Single Photon Emission Computed Tomography scans obtained post-stroke (3 scans, when possible) were co-registered to a standardized template to calculate standardized regional perfusion ratios. CCD was considered present if the z-score for contralateral-to-ipsilateral cerebellar ratios were ≤ -1.96 compared to normal controls. Z-scores also provided continuous measures of CCD severity. Lesion volumes were measured on Computed Tomography. Clinical severity and outcome were rated on the Hemispheric Stroke Scale (HSS) and Functional Independence Measure (FIM) acutely, at 1 month, and 1 year. *Results*: CCD was present in 67% of patients acutely, persisting in 79% subacutely, and 62% at 1 year. Lesion volume was greater in patients with CCD acutely (P<0.001), subacutely (P=0.014), and at 1 year (P=0.048). At one year, presence of acute CCD was associated with greater stroke severity (HSS) (P=0.001), but not worse functional outcome (FIM). The acute HSS accounted for most of the variance (59%, P=0.001) in 1 year HSS, with acute CCD severity contributing a further 5% to the model (P=0.004). *Conclusion*s: CCD is common in acute stroke, is associated with more severe deficits and a worse neurological but not functional outcome at one year.

D-07

Ischaemic stroke in the young: etiology differs between age groups

S Élysée (Montreal), S Lanthier (Montreal)*

Background: Ischemic stroke (IS) in the young is typically caused by aetiologies other than arteriosclerosis. Our objective is to compare risk factors (RF) and aetiologies between age groups among young individuals with IS. *Methods:* Consecutive 15-54-year-old individuals hospitalised for IS at our centre were divided into 4 age groups. RF and aetiological categories (large-artery arteriosclerosis, small-artery arteriosclerosis, high- or moderate-risk cardiopathies, arterial dissection, prothrombotic states, others, undetermined) were compared between age groups. *Results:* We analysed 170 individuals with IS. Age at IS was 15-34 (n=34), 35-44 (n=51), 45-49 (n=37), and 50-54 years (n=48). Male gender (p=0.01), hypertension (p=0.0005), hypercholesterolaemia (p<0.0001) and coronary artery disease (p=0.02) were more prevalent in the 45-54-year-old group. Aetiological investigations consisted of brain CT (n=170) or MRI (n=108), cervicoencephalic artery imaging by Doppler ultrasonography (n=170), MRA (n=94) or selective angiography (n=90), echocardiography (transthoracic, n=127, transesophageal n=94) extensive prothrombotic work-up (n=81), and lumbar puncture (n=12). Aetiologies differed between age groups (p<0.0001). Moderate-risk cardiopathies predominated at 15-44 years (p=0.002) and large- or small-artery arteriosclerosis at 45-54 years (p=<0.0001). Arterial dissection accounted for 29/170 (17%) IS. A prothrombotic state was found in 5/81 (6.2%) individuals selected for testing. Aetiology remained undetermined because of multiple possible causes in 8/170 (4.7%), no identified aetiology after complete investigation in 45/170 (26.5%), or incomplete investigation in 7/170 (4.1%). *Conclusions:* In young individuals with IS, RF and aetiologies differ between age groups. Moderate-risk cardiopathies are more prevalent before the age of 45 and arteriosclerosis after this age. Arterial dissection and undetermined aetiologies are frequent in young individuals with IS, whereas prothrombotic states are rarely found.

D-08

Pre-stroke functional status influences outcome in patients classified using the Oxfordshire Community Stroke Project classification system

C Josephson (Halifax), C Christian (Halifax), S Phillips (Halifax), G Gubitz (Halifax)*

Background: The Oxfordshire Community Stroke Project (OCSP) classification system accurately predicts long-term functional status. We evaluated whether pre-stroke functional status further enhances the prognostic capability of the OCSP on a stroke unit population in a Canadian teaching hospital. *Methods:* Over a two year period, 618 patients admitted to our multidisciplinary stroke unit were classified according to OCSP subtype and followed prospectively. Patients were designated as being previously independent or dependent according to their pre-stroke functional level. Functional outcome and discharge disposition were recorded at 12 months. *Results:* Patients with severe strokes (total anterior circulation strokes - TACS), were likely to be dependent at 12 months regardless of whether or not they were independent prior to their stroke (p<0.01). Patients with less severe stroke types (PACS, POCS, LACS) were statistically more likely to be independent at 12 months (p<0.01) if they were independent prior to their stroke (Modified Rankin < 3). These patients were also more likely to be at home 12 months post-stroke (p<0.01). Age and neurological co-morbidity may play a role. *Conclusions:* Pre-stroke functional dependence is associated with worse outcomes regardless of OCSP subtype. Pre-stroke functional status can be used to enhance the prognostic capacity of OCSP classification.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

Trauma and General Neurosurgery

E-01

Early serial SSEP studies for prediction of outcome in comatose patients with head injuries

D Houlden (Toronto), A Taylor (Hamilton), M Schwartz (Toronto), A Feinstein (Toronto), M Rajiv (Calgary), A Bethune (Toronto)*

Background: Somatosensory evoked potential (SSEP) grades in the first week after traumatic brain injury (TBI) are predictors of outcome more than one year later, but the optimal time for SSEP testing within that first week is not known. *Methods:* Serial median nerve SSEP measurements were obtained on the first, third and seventh day after TBI. The SSEPs were graded from 1 to 6 based on the amplitude and latency of cortically generated SSEPs. Glasgow Outcome Scale (GOS), Barthel Index, Rivermead Head Injury Follow-up Questionnaire (RHFUQ), General Health Questionnaire (GHQ), Stroop Colour-Word, Paced Auditory Serial Addition (PASAT) and Symbol-Digit Modalities (SDMT) outcome scores were obtained 1 year after injury. *Results:* SSEP grade on day 1 (n=76), day 3 (n= 72) and day 7 (n=58) related significantly with GOS, Barthel and Stroop scores but did not relate with RHFUQ or GHQ scores. Only day 3 and 7 SSEP grades related significantly with PASAT and SDMT. Day 3 SSEP grade was better than that obtained on day 1 (p=0.006) and day 7 (p=0.06) in relating to GOS, and better than that obtained on day 1 (p=0.02) in relating to Barthel scores. Patients with intermediate SSEP grades on day 1 that improved by day 3 had significantly better GOS (p=0.03) and Barthel scores (p=0.03) than those who had SSEP grade deterioration or no change between day 1 and 3. *Conclusions:* Day 3 SSEP grade had the strongest relationship with functional outcome one year later. Comatose patients with intermediate SSEP grades that improved by day 3 had a better prognosis for independent living than those that did not. SSEP grades related less strongly to scores of attention, information processing and working memory, but were not related to emotional well being.

E-02

McGill University Brachial Plexus Project: functional outcome and quality of life after surgery

M Labib (Montreal), J Golan (Montreal), L Jacques (Montreal)*

Background: Using statistically validated scales, quality of life in patients with traumatic brachial plexus lesions was evaluated after surgery. *Methods:* Brachial plexus injury patients treated from 1997 to 2004 were mailed the Short Form 36 (SF-36), the Disability of the Arm, Shoulder, and Hand (DASH) questionnaires and a Pain Visual Analog Scale (PVAS). *Results:* Thirty one patient participated in the study with a mean age of 32.7 years. Compared to the general population, there was a significantly higher level of disability, as measured by the DASH ($P < 0.001$). Patients who received surgery in less than 6 months after their injury scored better in the DASH ($p = 0.021$) and the SF-36 physical component ($p = 0.022$). The time period between injury and surgery correlated negatively with the performance on the DASH and the SF-36. Patients with root avulsion injuries scored worse than those with root stretches. Overall, 75 % of the patients would definitely or most probably have decided to re-undergo the surgery again. This decision was statistically correlated with the scores in the DASH and PVAS. *Conclusion:* The SF-36 and DASH are useful measures of disability and QOL in patients following brachial plexus repair. Root avulsion and long waiting time to surgery correlated with worse outcome.

E-03

Early Hypodensity on Computed Tomography in Accidental Pediatric Head Injury

A Singhal (Vancouver), P Steinbok (Vancouver), K Poskitt (Vancouver)*

Background: In the acute phase after blunt force cranial trauma, hypodensities on computed tomography (CT) are seen more commonly in children than in adults. The precise timing of onset of these CT detected abnormalities, traditionally believed to occur at least 6 hours after the injury, is important from a medicolegal viewpoint, and may be important for prognostication. *Methods:* A retrospective review was performed, and identified 5 patients admitted to British Columbia Children's Hospital with confirmed accidental severe head injury, who were identified to have early CT detected brain hypodensities. *Results:* We present 5 pediatric patients (age 4 months to 14 years) with accidental head injury, who demonstrated early (less than 4 hours) CT brain hypodensities. The timing of the first CT scan varied from 90 minutes to 4 hours. Four of the 5 injuries were the result of falls and 1 injury was the result of a motor vehicle collision. All 5 presented with severe head injuries, and all 5 progressed rapidly to brain death within 48 hours. *Conclusions:* It is possible to develop early (less than 4 hours) CT hypodensities after accidental head injury, and in our small series, this predicted a poor outcome.

E-04

Clinical Predictors of Outcome in Children Admitted with Mild Head Injury

J Atkinson (Montreal), D Friedman (Montreal), J Montes (Montreal), J Farmer (Montreal)*

Objectives: To determine the clinical and historical characteristics of a group of pediatric patients admitted following mild head injury, and to determine the predictive value of these characteristics with respect to clinical outcome as measured by length of stay. *Methods:* A retrospecive review was performed of the traumatic injuries database at the Montreal Children's Hospital from April 2001 - April 2005. In the mild and moderate head injury population, the relationship between length of stay and 32 clinical characteristics were determined both by univariate descriptive means and by multivariate logisitic regression analysis. *Results:* 1300 admission were included in the study period. Positive CT scan, neurosurgical procedure, male sex, admission to a service other than neurosurgery, ambulance transport to hospital, head injury severity, and other system injury were all statistically significant predictors of a length of stay longer than 1 day. *Conclusions:* Many commonly assessed clinical signs and symptoms do not appear to predict the acute

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

clinical course of mild head injury. Future investigations and therapeutic interventions need to be assessed based on their influence on patient outcome.

E-05

In Situ Autologous Split Bone Cranioplasty for Reconstruction of Skull Defect: A Technical Note

A Singhal (Vancouver), P Gan (Vancouver)*

Background: Skull defects are commonly created in neurosurgery either as part of the treatment process, such as removal of skull tumours or decompressive craniectomy, or as a complication of surgery when the bone graft becomes infected and needs to be removed. Strategies to close the bone defect have included cadaveric bone grafts, synthetic materials, or split calvarial bone grafts. We present a simple and effect method of cranioplasty, using the lateral edges of the bone defect. *Methods:* A case report is presented, with accompanying operative photographs, demonstrating the principles involved in harvesting, in situ, split thickness bone grafts. *Results:* A 12 year old female presented with progressive scalp swelling, and examination and Computed Tomography demonstrated a 6.1x 6.7 cm right parietal bone mass. After performing a craniectomy, including resecting a margin of bone around the mass, the patient had a 7 x 7 cm skull defect. Strips of split thickness bone measuring 2 cm were harvested from the free edge of the surrounding bone by using a curved osteotome in the bone diploic spaces, taking care to not fracture the bone. The bone strips were then laid parallel to each other over the defect taking care to match the curvature of the skull as closely as possible. The strips of bone are then secured firmly to the surrounding skull with thick Vicryl sutures. The wound was then closed in the standard fashion. The patient suffered no complications, and the pathology in this instance was fibrous dysplasia. At 6 month follow-up, the bone was well fused, with excellent cosmetic result. *Conclusions:* In situ autologous split thickness bone grafts are less invasive than craniotomy for bone graft harvest, are inexpensive alternatives to synthetic materials, and can result in good fusion and cosmesis.

E-06

Percent alpha variability on intensive care unit continuous electroencephalography correlates with lesion characteristics and predicts long-term outcome in patients with traumatic brain injury

M Hebb (Halifax), D McArthur (Los Angeles), T Glenn (Los Angeles), M Bergsneider (Los Angeles), M Etchepare (Los Angeles), P Vespa (Los Angeles)*

Background: The percent alpha variability (PAV) on continuous electroencephalographic (cEEG) recordings has been shown to predict early clinical outcomes after traumatic brain injury (TBI). The current study sought to determine whether PAV was predictive of longterm recovery in TBI patients and whether specific loci of cerebral injury were correlated with PAV and patient outcomes. *Methods:* 53 patients with moderate or severe TBI required direct admission to the neurological intensive care unit and were prospectively enrolled into a standardized protocol that included cEEG recording and serial neuroimaging. The primary outcome measures included the mean three-day PAV score, delineation of the anatomical sites of brain injury, and the six-month clinical outcome, as measured by the Glasgow Outcome Scale (GOS). *Results:* Significant correlations ($p = 0.008$) were identified between PAV and GOS scores. PAV offered good discrimination between favorable and unfavorable six-month outcomes (area under ROC curve 0.76) and, with a cutpoint of 0.20, had a sensitivity of 87% and negative predictive value of 82%. Injuries of the thalamus ($p = 0.009$) and basal ganglia ($p = 0.016$), as well as the presence of diffuse edema ($p = 0.009$), were the key anatomical predictors of PAV. Diffuse cerebral injuries were the principal determinants of six-month recovery. Inclusion of PAV significantly enhanced the accuracy of prediction models that contained optimized combinations of conventional variables (adjusted $R2 = 0.458$, $p < 0.001$). *Conclusions:* Early hospital PAV scores are a sensitive predictor of latent clinical outcomes following TBI. The anatomical correlations presented here support the involvement of the thalamus in generation of the normal alpha rhythm. PAV appears best utilized as a functional adjunct to traditional clinical and anatomical predictors.

Multiple Sclerosis

F-01

Prevalence of multiple sclerosis in Canada - mosaic or melting pot?

A Poppe (Montreal), C Wolfson (Montreal)*

*Background:*Studies of multiple sclerosis (MS) prevalence within Canada have almost exclusively been isolated to specific regions. A more comprehensive review of Canadian MS prevalence examining current data, interregional variation, deficiencies in knowledge and frontiers for research therefore seemed necessary. *Methods:* A systematic review of all studies addressing the prevalence of MS in Canada or regions within Canada, published in English or French since 1985, was conducted. Studies were identified using MEDLINE, EMBASE and bibliographic review, which yielded nine studies. These were evaluated for methodological rigour and a test of heterogeneity across studies was performed and a measure of consistency (I2) was estimated. *Results:* Studies were generally of high quality. Eight were restricted to regions within Canada and one addressed national prevalence through self-report. All suggested a high prevalence (>30 per 100 000), the highest being 386/100 000 for Alberta. Latitude and longitude gradients were not striking while tests of heterogeneity confirmed that regional differences were not the result of random variation alone. *Conclusions:* All studies suggest a high prevalence of MS in Canada. This review is the first to demonstrate that variation in the different study populations exceeds that expected from chance, suggesting that differences in regional estimates may represent true differences in MS prevalence within Canada. Avenues for future MS prevalence research, including adoption of a national MS registry, are proposed.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

F-02

Risk Of Conversion To Clinically Definite Multiple Sclerosis In Acute Partial Transverse Myelitis and Normal Brain MRI

A Ciofani (Toronto), M Hohol (Toronto)*

Background: The risk of conversion to clinically definite multiple sclerosis (CDMS) in patients with acute partial transverse myelitis (APTM) and a normal brain MRI is not well established. *Methods:* Seventy patients with APTM, at least one spinal cord MRI lesion and a normal brain MRI and seventy patients with APTM and a brain MRI consistent with MS were studied by retrospective chart review. *Results:* Baseline patient demographics were not significantly different between the two groups. Mean age at presentation was 34, 73% of patients were female. Average follow-up was 70 months. Risk of conversion to CDMS was 19/70 (27%) in the normal brain MRI group and 35/70 (50%) in the abnormal brain MRI group, p=0.006. Mean time to conversion to CDMS did not differ significantly between the normal and abnormal brain groups (28.4 versus 26.9 months, p=0.86). Mean Expanded Disability Status Scale (EDSS) score at final follow-up was also similar between the normal and abnormal brain groups (1.5 versus 1.8, p=0.52). No additional predictors of conversion to CDMS were found. *Conclusions:* After an average of six years, patients presenting with APTM and a normal brain MRI were less likely to have converted to CDMS (27%) than those with an abnormal brain MRI (50%), however there was no difference in time to conversion.

F-03

Serial texture analysis in deep gray matter of patients with multiple sclerosis treated with minocycline

Y Zhang (Calgary), L Metz (Calgary), H Zhu (Toronto), V Yong (Calgary), J Mitchell (Calgary)*

Background: Deep gray matter (GM) abnormalities in multiple sclerosis (MS) are difficult to detect on conventional MRI because of their small size and low contrast with surrounding tissue. However, diffuse deep GM pathology has been increasingly recognized in the pathogenesis of MS. Here we applied the polar stockwell transform (PST) on T2-weighted (T2w) MRI to analyze texture changes over time in the deep GM of MS patients treated with minocycline. Methods Ten relapsing remitting MS patients were enrolled in a cross over trial of minocycline. Eight completed 24 months study. Texture in structures thalamus, globus pallidus, putamen, and the head of caudate nucleus on 3T MRI was analyzed pretreatment (at baseline), at month 6 and then annually during treatment. Results The texture tended to change from coarseness to finesse after 24 months on drug. Such changes were higher in active than in inactive patients. The texture improvement was the largest in the head of the caudate nucleus. Conclusions This study suggests that the PST may be a new tool to monitor deep GM pathology. Future studies seek to verify these results and to correlate MR texture with clinical indicators of MS.

F-04

Adult Neural Precursor Cells as a Therapeutic Means for Remyelination and Molecular Repair of Dysmyelinated Axons: Implication for Demyelinating Diseases

E Eftekharpour (Toronto), S Karimi-Abdolrezaee (Toronto), J Wang (Toronto), C Morshead (Toronto), M Fehlings (Toronto)*

Background: Disruption of myelin in demyelinating diseases results in changes in the function and molecular organization of axons, including disorganization of nodes of Ranvier. Restoration of myelin by cell replacement has been shown in many models, although to date there is no evidence that this strategy can reverse the demyelination-associated changes in the axonal molecular domains. *Methods:* We transplanted adult-brain derived neural precursor cells (aNPCs) into the thoracic spinal cord of Shiverer (shi/shi) mice which lack myelin basic protein and central myelin. *Results:* The transplanted aNPCs expressed myelin basic protein (MBP) as early as one week after transplantation. Six weeks after transplantation, the majority of transplanted cells expressed oligodendrocyte markers, extensive MBP expression as well as compact myelin formation by electron microscopy and MRI. Quantitative confocal microscopy revealed evidence of significant restoration of axonal molecular domains in the transplanted segments of the shi/shi spinal cord to a more normal state, as evidenced by reappearance of nodes of Ranvier and restored localization of Kv1.2 and Caspr, two important molecules of axonal membrane. *Conclusion:* We report for the first time, that remyelination of the central nervous system restores the molecular organization of dysmyelinated axons to a more physiological state, indicating the potential application of cell therapies for myelin repair.

F-05

Do depressive symptoms influence disease progression in Multiple Sclerosis?

S Kirby (Halifax), J Fisk (Halifax), V Bhan (Halifax), M Brown (Halifax), P Andreou (Halifax), K Stadnyk (Halifax), D MacKinnon-Cameron (Halifax)*

Purpose: This study examined disease progression for multiple sclerosis (MS) patients with and without depressive symptoms (DS). *Methods:* The Dalhousie Multiple Sclerosis Research Unit (DMSRU) maintains clinical records on patients seen since 1979. Records of 1717/1730 patients with clinically definite MS were available for review. If a diagnosis of depression or clinically significant symptoms of depression were noted during a DMSRU visit, patients were considered to have DS. Patients with DS evident at their first DMSRU visit ("early onset DS") were distinguished from those who developed DS at later visits ("late onset DS"). For univariate analyses, Kaplan-Meier curves for time to EDSS scores of 3, 4, 6 and 8 were compared using the log-rank test. Then parametric models were fitted controlling for: class of MS, sex, age at MS onset, presenting symptoms, presence of other medical or psychiatric illness, and treatment with immune modulating therapy. *Results:* Both "early onset" and "late onset DS" symptoms were associated with faster progression to EDSS 3, 4 and 6. Males with "early onset DS" progressed faster than males with "late onset DS". *Conclusions:* The presence of DS is associated with faster disease progression in

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

MS patients. For males, the presence of DS early in their course may be associated with poorer outcome.

F-06

Clinical effectiveness of disease modifying treatment (DMT) that delays disability progression in relapsing/remitting-onset multiple sclerosis

M Brown (Halifax), S Kirby (Halifax), T Murray (Halifax), V Bhan (Halifax), I Sketris (Halifax), J Fisk (Halifax), J Hoch (Toronto)*

Background: Clinical trials efficacy evidence for disease modifying treatment (DMT) that delays disability progression in relapsing/remitting-onset definite MS (RR-onset MS) is controversial. This paper reports evidence of DMT clinical effectiveness in the 'real world'. Methods: Estimates of Extended Disability Status Scale (EDSS) natural history increase per year, increase avoided per DMT-year, and DMT effect size relative to natural history are made using well-validated 1979-2004 data from 9,238 clinic visits by 1435 persons with RR-onset MS to the Dalhousie MS Research Unit clinic, Nova Scotia. Models estimate EDSS paths from years-since-onset (yso) given 'conventional care' or DMT. Analysis is stratified by 'final' MS classification (relapsing/remitting or secondary progressive), disability severity and years-since-onset. Results: Estimates indicate DMT is effective in avoiding (delaying) disability progression in RR-onset MS. Effect sizes (absolute and relative) are larger for RRMS than SPMS subgroups. Estimates vary by subgroups, natural history controls (all, self-controls), severity (EDSS<=3.5, <=6.5), years-since-onset (yso<=10, <=20, <=30), treatment duration and model specification. Conclusions: Disease modifying therapies delay disability progression in relapsing/remitting-onset definite MS. Treatment effect size relative to natural history is larger in earlier years-since-onset, when disability is 'low', than in later years, when disability is 'moderate' and more patients are secondary progressive.

DEMENTIA

G-01

Corpora Amylacea formation in amnestic Mild Cognitive Impairment

H Zukor (Montreal), A Liberman (Montreal), D Bennett (Chicago), H Schipper (Montreal)*

Background: CA are glycoproteinaceous inclusions that accumulate in normal aging brain and, to a greater extent, in AD. aMCI is widely considered a prodromal state of sporadic AD. It is unknown whether the excessive accumulation of CA is an early or late event in the pathogenesis of AD. *Methods:* Hippocampal sections derived from patients with aMCI (n=9) and no cognitive impairment (NCI; n= 9) were stained with PAS and antisera directed against heme oxygenase-1 (HO-1), manganese superoxide dismutase (MnSOD), or ubiquitin. Numbers of CA per unit area were quantified under light microscopy and protein constituents of CA were further assessed by confocal microscopy. *Results:* Numbers of HO-1-positive CA were significantly increased in specific hippocampal strata of aMCI subjects relative to NCI preparations matched for age and post-mortem interval. MnSOD immunoreactivity within aMCI CA was considerably more intense than in NCI counterparts. *Conclusions:* Numbers of CA in the MCI hippocampus are elevated relative to NCI preparations indicating that the biogenesis of CA is an early event in the pathogenesis of sporadic AD. The robust expression of MnSOD in MCI CA supports our contention that oxidatively damaged mitochondria are a subcellular precursor of CA in AD-affected neural tissues.

G-02

Effects of Long-Term Cholinergic Therapy on Regional Cerebral Perfusion in Alzheimer's Disease (AD)

P Behl (Toronto), C Caldwell (Toronto), A Cotter (Toronto), S Black (Toronto)*

Background: Alzheimer's patients treated with cholinesterase inhibitors show less perfusion decline in frontal and parieto-temporal regions in some series. A treated cohort, matched to untreated patients in the same longitudinal study, showed less decline in executive, and visuoconstructive tasks over one year. We hypothesized less perfusion decline on SPECT in brain regions subserving these domains, specifically, left dorsolateral prefrontal (DLPFC) and right posterior parietal regions. *Methods:* Patients (untreated=15, treated=15) with probable AD underwent triple-head ECD SPECT scanning, which was co-registered to an MRI-derived ROI anatomical template. Perfusion ratios were referenced to the cerebellum. *Results:* Groups were comparable on baseline demographics. Repeated measures MANOVA on the above regions showed a significant interaction (p=0.014) with less decline in treated patients in the left DLPFC. *Conclusion:* Treated patients showed stable perfusion over one year in the left DLPFC, which mediates certain executive functions. The parietal cortex is targeted early in AD and may therefore be less susceptible to benefit from cholinesterase inhibition. Less decline in frontal perfusion paralleled less executive decline, providing level II evidence for multimodal cholinergic treatment effects in AD over one year.

G-03

Expression profiling of blood mononuclear cells in Alzheimer disease

O Maes (Montreal), S Xu (Louisville), B Yu (Louisville), H Chertkow (Montreal), H Bergman (Montreal), E Wang (Louisville), H Schipper (Montreal)*

Background: There is growing awareness of systemic oxidative stress (OS) and other biochemical derangements in sporadic AD affecting blood and other peripheral tissue constituents. Methods: Blood mononuclear cell (BMC) expression profiles (6424 genes) of 14 AD subjects and 14 aged-matched normal elderly controls (NEC) were analyzed using the NIA Human MGC cDNA microarray. Results: The AD subjects exhibited significant gender-specific differences in BMC gene expression. Overall, 28% and 16% of the up- and down-regulated genes, respectively, were reported to exhibit similar expression profiles in AD brain and transgenic AD mouse models. Changes in the AD BMC transcriptome indicated

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

engagement of the apoptotic pathway and inflammatory response in the face of inadequate DNA repair mechanisms and antioxidant defense. Conclusions: Microarray analysis of the BMC transcriptome further attests to the presence of profound systemic alterations in early sporadic AD which may reflect pathogenetic mechanisms in the affected brain tissues.

G-04

Heme Oxygenase-1 over-expression promotes morphological alterations in astroglial mitochondria

H Zukor (Montreal), W Song (Montreal), J Mui (Montreal), H Vali (Montreal), H Schipper (Montreal)*

Background: Astroglial HO-1 over-expression, aberrant iron mobilization, and mitochondrial damage have been observed in the brains of AD and PD patients. HO-1 up-regulation in rat astroglial cultures promotes mitochondrial oxidative injury and iron sequestration (Schipper HM, Ageing Res Rev 3: 265-301, 2004). Here, we determined whether HO-1 up-regulation induces morphological changes in glial mitochondria and other subcellular compartments. *Methods:* Cultured neonatal rat astrocytes were transiently transfected with varying doses of human HO-1 cDNA in the presence and absence of the HO inhibitor, tin mesoporphyrin (SnMP). Cell ultrastructure was evaluated at various times post-transfection by transmission electron microscopy. *Results:* HO-1 over-expression induced profound morphological alterations in mitochondrial membranes in a time- and dose-dependent manner, The HO-1 transgene also stimulated the formation of corpora amylacea-like inclusions in these preparations. Administration of SnMP abrogated the dystrophic effects of HO-1 over-expression on astroglial ultrastructure. *Conclusion:* HO-1 up-regulation may contribute to pathological iron deposition, mitochondrial insufficiency and the biogenesis of corpora amylacea in aging-related human neurodegenerative disorders.

G-05

Spontaneous intracranial hypotension causing reversible frontotemporal dementia and coma

A Sayao (Vancouver), M Heran (Vancouver), K Chapman (Vancouver), G Redekop (Vancouver), D Foti (Vancouver)*

Background: Spontaneous intracranial hypotension (SIH) is usually a benign disease with little neurological consequence other than postural headache. However, in a few cases the clinical presentation is severe and can include cognitive changes, encephalopathy, obtundation or coma. The management options for atypical cases of SIH must be well known to all neurologists. *Methods:* We describe the first case of combined frontotemporal dementia and coma, caused by SIH that was successfully reversed with intrathecal saline infusion and then definitively treated with a targeted CT-guided C2 epidural blood patch, the highest yet reported. A review of the limited previously published cases of SIH causing FTD or alterations in consciousness is provided. Pathophysiologic mechanisms, diagnosis and treatment options are highlighted. *Results:* Most severe cases of SIH are caused by a persistent CSF leak that is not visualized on preliminary imaging. One such previously published case of SIH causing FTD reported partial improvement with a four-month course of steroids. A few previous case reports described the use of an intrathecal saline infusion to successfully reverse obtundation and coma associated with SIH. This procedure has increased the diagnostic yield of MRI or CT-myelogram in identifying CSF leak sites. Targeted therapeutic epidural blood patching has a high treatment success rate and lowers the likelihood of repeated procedures. *Conclusion*: Spontaneous intracranial hypotension should be considered on the differential diagnosis of rapidly progressing FTD, encephalopathy and obtundation/coma in the setting of postural headache. The current case illustrates that correct diagnosis and treatment can restore cognitive function and be lifesaving. Neurologists should be familiar with the use of intrathecal saline infusions and targeted epidural blood patches in this condition.

G-06

Medication use in patients presenting to a rural and remote memory clinic

T Steve (Saskatoon), A Kirk* (Saskatoon)*

Background: Elderly patients presenting with memory complaints are often taking medications which may include anticholinergic, benzodiazepines, or other drugs that may contribute to cognitive symptoms. *Methods:* The first 56 patients presenting to our Rural and Remote Memory Clinic were included in this study. During assessment by a neurologist, geriatrician, and neuropsychologist, a detailed medication history was obtained. *Results:* Patients presented to the clinic on a variety of medications, encompassing fourty-five different classes. In total 52 (92.9%) of the 56 patients were taking at least one medication. The mean number of medications taken was 4.52 medications per patient. The number of patients taking anticholinergic medications upon first assessment was fifteen (26.8%) and the number taking benzodiazepines was nine (17.3%). *Conclusions:* Many rural patients present with memory complaints while taking a number of medications, including some which may be contributing to their symptoms.

Nerve and Muscle

H-01 *Herbert Jasper Prize - CSCN*

Randomized controlled trial of post surgical electrical stimulation to promote nerve regeneration in carpal tunnel syndrome

N Amirjani (Winnipeg), K Chan (Edmonton), T Gordon (Edmonton), D Edwards (Edmonton), N Ashworth (Edmonton)*

Background: Electrical stimulation of peripheral nerves after crush injury and axotomy augments axonal regeneration in adult laboratory animals. However, the clinical applicability of this intervention has never been investigated in humans. The aim of this study was to test the effect of electrical stimulation on axonal regeneration after decompression surgery in carpal tunnel syndrome. *Methods:* In a randomized controlled trial, we investigated the effect of 1-hour continuous 20Hz electrical stimulation following decompression surgery on axonal regeneration of the median nerve,

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

compared to decompression surgery only. Subjects were followed for one year at regular intervals. Motor unit number estimation (MUNE) was used to quantify the axonal regeneration. Additionally, sensory and motor nerve conduction studies, Purdue Pegboard Test, Semmes Weinstein Monofilaments, and Levine's Questionnaire were used to assess functional recovery. *Results:* The stimulation group had significant axonal regeneration 6-8 months after the procedure when the MUNE increased to 290±140 (Mean±SD) from 150±62 at baseline ($p<0.05$). In comparison, MUNE did not significantly improve in the control group ($p>0.2$). Sensory nerve conduction values significantly improved in the stimulation group earlier after the treatment than the controls. Terminal motor latency accelerated in the stimulation group but not in the control group ($p>0.1$). Other outcome measures showed a significant improvement in both groups. *Conclusion:* One-hour of continuous 20 Hz electrical stimulation of the median nerve following decompression surgery significantly augmented axonal regeneration. The procedure was feasible and well tolerated by subjects.

H-02

Diagnostic utility of needle electromyography of the abductor pollicis brevis muscle in evaluating carpal tunnel syndrome

J Kurniawan (Halifax), T Benstead (Halifax), I Grant (Halifax)*

Background: Electromyographers evaluate carpal tunnel syndrome (CTS) frequently. The American Association of Electrodiagnostic Medicine guideline regards needle electromyography (EMG) on the abductor pollicis brevis muscle (APB) as optional for CTS evaluation. Thus, we assessed the frequency of EMG of the APB and its utility in evaluating patients with CTS. *Methods:* We retrospectively reviewed 226 EMG reports on patients with electrodiagnostically confirmed CTS. *Results:* 50.6% of cases were graded as moderate CTS and only 8% were severe based on nerve conduction criteria. Our electromyographers performed EMG on the APB in 24% patients with very mild, 32% with mild, 44% with moderate and 68% with severe CTS. In very mild/mild CTS, EMG of APB was abnormal in only one patient. In moderate CTS, 72.7% were abnormal but none showed fibrillation potentials. In severe CTS, all APBs studied were abnormal (2/17 demonstrated absent MUP). *Conclusions:* Our electromyographers were more likely to perform EMG of the APB in severe CTS. The absence of MUP in a subset of patients in this group may make surgical treatment less beneficial. Most patients had CTS graded as moderate or milder. In these patients, needle EMG of APB did not add information about severity or influence decision for surgical treatment.

H-03

Severe Duchenne Muscular Dystrophy Phenotype Associated with a Novel Dystrophin Gene Mutation

L Korngut (London), V Siu (London), S Venance (London), S Levin (London), P Ray (London), C Campbell (London)*

Background: Duchenne muscular dystrophy (DMD) is an X-linked recessive neuromuscular condition resulting from a mutation of the dystrophin gene. The phenotype is usually consistent with a progressive proximal muscle weakness noted first at approximately age two years. More severe phenotypes are uncommon and may be related to the exact location and extent of the mutation. Case Report: The case of a 7 year-old boy with gross motor delay identified at age 8 months is described. He has never reached the milestones of sitting, crawling or walking. On examination at 4 years of age the patient exhibited profound generalized weakness with maximal involvement of the shoulder girdle region bilaterally. Language development was normal. Investigations revealed a creatine kinase of 2,639 I.U./L, normal MRI of brain and spinal cord, and muscle biopsy diagnostic for DMD. Direct sequencing of the dystrophin gene revealed a hemizygous mutation for a deletion of two nucleotides (GT) at nucleotide position 367_368 in exon 6 of the dystrophin gene. This novel sequence alteration would predict a frameshift change of the coding sequence after codon 123 and a stop codon at codon 400. Conclusion: We report a novel dystrophin gene mutation resulting in a severe DMD phenotype. The severity of phenotype is due to a frame-shift mutation affecting the 5' actin binding domain at the amino-terminus of the dystrophin protein although other possibilities will be discussed.

H-04

Genotype - phenotype correlation in myotonic dystrophy

N Moradin (Tehran), B Shojasaffar (Tehran), A Cobo (San Sebastian), S Nafisi (Tehran), A Vojdani (Tehran), M Azimian (Tehran), S Mousavi (Tehran), K Kahrizi (Tehran), H Najmabadi (Tehran)*

Introduction: Myotonic dystrophy (DM) type I- the most common form of muscular dystrophy in adults, affecting 1/8000 individuals - is a dominantly inherited disorder with a multisystemic pattern affecting skeletal muscle, heart, eye and endocrine system . DM is associated with the expansion and instability of a trinucleotide (CTG) repeat in the 3' untranslated region of the myotonic dystrophy protein kinase (DMPK) gene located on chromosome 19q13.3 .The normal copy number of 5 - 37 CTG repeat is exceeded in DM patients, with the size of the expansion broadly correlating with the severity of symptoms experienced. The aim of this study was genotype-phenotype correlation in the Iranian population. We analyzed a small group of these patients for determination of clinical and genetic characteristic of DM1. *Materials and methods:* Molecular analysis (PCR & Southern blot) was used to clarify equivocal clinical diagnoses and confirm clinical findings. Diagnosis was based on clinical and Electromyograph (EMG) exam. 82 patients (46 families) registered with DM were reviewed. In 58 patients (70/73%), we detected one band and 24 patients have no expansion of the repeat (two bands).We studied 25 DM - families, a total of 36 patients who were single band (23 male, 13 female, mean age 37.4 ± 13.3), of whom 21 were diagnosed with a trinucleotide repeat expansion and the rest of them are in progress. *Results:* The mean of normal CTG expansion was (8.6 ± 3). Twenty patients had CTG repeat expansion between 130 and 800, and one of the patients had 97 CTG repeat expansion. We found relation with Muscular Disability Rating Scales (MDRS) and a Sum of Symptoms Score (SSS), age of onset and the number of expansion. *Conclusion:* Our

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

results proved correlation of the expansion size and muscular disability except for one case with no signs of myotonia. There is no correlation of cataract and endocrine dysfunction and the expansion size in DM1 patients.

H-05

Late-onset Tay-Sachs disease, a novel approach to therapy.

E Atkins (Saskatoon), J Donat (Saskatoon), D Mahuran (Toronto)*

Background: Late onset Tay-Sachs disease can masquerade as other neuromuscular disorders, making diagnosis challenging. There is no proven treatment for hexosaminidase-A (Hex A) deficiency; however, experimental work with pharmacological chaperones shows promise. *Methods:* A case presentation designed to raise awareness of the clinical and genetic manifestations of late onset Hex A deficiency, as well as to present some experimental work on the use of pharmacological chaperones. *Results:* A 30 year old woman of non-Jewish background presented with proximal leg weakness, fasciculations, muscle cramps, and hand clumsiness. Initial assessment and investigations suggested motor neuron disease. For completeness, an assay of serum hexosaminidase activity was ordered, which revealed undetectable levels of Hex A in white blood cells and plasma. Remarkably, two sets of a very rare mutation in the HEXA gene were identified. Further work with this patient's blood samples revealed that pharmacological chaperones can form stabilizing dimers with the mutant proteins, allowing more release to the lysosome and less accumulation and storage in the endoplasmic reticulum. *Conclusions:* This case highlights the importance of obtaining Hex A activity studies in patients with signs of motor neuron disease, and prompts discussion of experimental work using pharmacologic chaperones as a novel approach to therapy.

H-06

A Prospective Identification of Neuropathic Pain in Specific Peripheral Neuropathy Syndromes and Response to Pharmacological Therapy

S Au (Calgary), C Toth (Calgary)*

Background: Although neuropathic pain (NeP) due to peripheral neuropathy (PN) is a common condition, there is little information regarding the prevalence of NeP and the effect of pharmacological therapy upon NeP in specific forms of PN. *Objectives:*We sought to determine the prevalence of NeP and the response of NeP to pharmacological therapies in specific PN syndromes. *Methods:* Prospective identification of PN patients with a new diagnosis of PN with or without NeP in a tertiary care neuromuscular clinic over a two year period occurred. The Toronto Neuropathy Clinical Score (TNCS), Neuropathic Pain Disability score (NPD), and visual analogue score (VAS) were examined pre- and post-pharmacological therapy after follow-up periods of 3 and 6 months. *Results:* Prospective identification of 147 PN patients with NeP and 92 PN patients without NeP with greater than 90% follow-up after 3 and 6 months occurred. PN patients with NeP were similar to PN patients without NeP in terms of age, sex, and TCNS. Idiopathic PN was more likely to present without NeP while alcohol-induced PN was more likely to present with NeP. Pharmacological therapy improved the NPD after 3 months in patients with PN due to diabetes mellitus, vitamin B12 deficiency, alcohol, and idiopathic causes, but without further benefit after 6 months. Although no specific NeP pharmacological therapy was associated with greatest NeP relief, VAS scores improved by 15-30% after 3 and 6 months of follow-up in NeP PN patients. *Conclusion:* PN Patients with NeP and without NeP have similar TNCS, and alcohol-induced PN is more likely to present with NeP. Although possible improvements in disability due to NeP may occur with pharmacological therapy, more detailed studies examining quality of life and overall disability are required in PN patients.

Cerebrovascular Surgery

I-01

Preoperative imaging of carotid stenosis: use of magnetic resonance imaging following ultrasonography

M Findlay (Edmonton), M Jacka (Edmonton), V Patel (Edmonton), D Emery (Edmonton)*

Purpose: Magnetic resonance angiography (MRA) is now commonly used to further investigate carotid stenosis detected by screening ultrasonography (US). We reviewed the correlation between these two tests in a surgical practice. *Methods:* At the University of Alberta MRA has gradually replaced catheter angiography in the assessment of patients with carotid stenosis detected on carotid US (excluding patients with suspected carotid occlusion). A total of 158 patients with US stenosis in the 50-99% range undergoing surgical assessment had both investigations between 2001 and 2005, and the results were compared retrospectively. *Results:* Two patients (1.3%) required catheter angiography because of unclear MRAs; in both angiography results correlated with US (severe stenosis; 70-99%). In 103 patients with US severe stenosis there was a 100% correlation with the results of MRA (kappa 1.0). In 55 patients with moderate US stenosis 50-69% MRA results correlated in 43 patients (78%), but stenosis on MRA was interpreted to be less than 50% in 6 patients (11%) and greater than 69% in 6 (11%, kappa 0.55). *Conclusion:* In our experience good correlation exists between carotid US and magnetic resonance angiography for severe stenosis (70-99%) and US is now considered sufficient for treatment planning in this group. Although reasonable correlation between US and MRA for moderate disease was found in terms of kappa, this is not sufficient for surgical planning. Consideration should be given to investigate moderate US stenosis further with catheter angiography.

I-02

Intracranial Dural Arteriovenous Fistula (DAVF): Diagnosis and Characterization with ATECO MRA

P Klurfan (Toronto), R Farb (Toronto), I Shelef (Toronto), T Gunnarsson (Toronto), D Mikulis (Toronto), R Willinsky (Toronto), K TerBrugge (Toronto)*

Background: Intracranial DAVF are classified as benign or aggressive types based on the presence or absence of cortical venous reflux (CVR). Auto-triggered Elliptic Centric-ordered 3D

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

Gadolinium-enhanced MR Angiography (ATECO) has been proven to be a reliable non-invasive vascular imaging technique. The purpose of this study is to evaluate and compare the performance of ATECO MRA and digital subtraction angiography (DSA) in the diagnosis and evaluation of intracranial DAVF. *Methods:* Twenty-eight ATECO MRA - DSA comparisons that were performed in 23 patients diagnosed with intracranial DAVF's based on DSA. Three neuroradiologists reviewed the ATECO MRA to determine: 1) presence or absence of DAVF, 2) presence or absence of CVR and 3) the location of the lesion. The results were compared with the corresponding DSA. *Results:* As compared to DSA, ATECO MRA yielded one false positive and one false negative result. Of the 14 studies with confirmed CVR on DSA 13 (93%) were detected on ATECO. The overall sensitivity and specificity of ATECO MRA for the detection of DAVF is 95% and 89% respectively. *Conclusion:* This study suggests that ATECO MRA is a reliable non-invasive imaging modality for the diagnosis and follow up of patients with intracranial DAVFs.

I-03

Transvenous Treatment of Cranial Dural Arteriovenous Fistulas with Hydrogel Coated Coils

P Klurfan (Toronto), T Gunnarsson (Toronto), I Shelef (Toronto), R Willinsky (Toronto), K TerBrugge (Toronto)*

Background: Aggressive DAVFs become symptomatic due to venous congestion. Transarterial treatment has been shown to have a relatively low cure rate. Transvenous approach has been used successfully for selective disconnection to eliminate the venous congestion. Limitations of this approach are related to access difficulties and the embolic materials. Coils are now widely used for this purpose. The disadvantage of this technique is that often a great number of coils need to be deployed to fill large venous spaces. Recently hydrogel coated platinum coils (Hydrocoil(r)) have become available. The hydrogel coating swells after contact with blood causing the coils to swell up to 5-11 times. *Methods:* We analyzed the data of patients with DAVFs treated using hydrocoils. The patients' characteristics, symptoms, angioarchitecture, treatment, complications and results were analysed. *Results:* Nine patients, with cranial DAVF underwent transvenous approach using Hydrocoils. All DAVFs were cured or successfully disconnected on the post-procedural angiogram. All the patients with orbital symptoms had significant improvement within 3-24 hours following the procedure. There were no procedure related complications. *Conclusions:* Hydrogel coated platinum coils can be used effectively and safely to treat cranial DAVF through a transvenous approach.

I-04

Morbidity associated with the endovascular re-treatment of recurrent cerebral aneurysms

J Spears (Toronto), K TerBrugge (Toronto), S Lee (Toronto), T Jonas-Kimchi (Toronto), R Agid (Toronto), R Farb (Toronto), M Tymianski (Toronto), M Wallace (Toronto), R Willinsky (Toronto)*

Background: Aneurysm recurrences following endovascular therapy occur in 10-30% of cases. Of these recurrences a small proportion are considered clinically significant enough for re-treatment. When considering the overall morbidity of permanent protection of an aneurysm with endovascular techniques the associated morbidity of future re-treatments must be quantified. *Methods:* A retrospective cohort study was performed using the Toronto Western Hospital Aneurysm database. Morbidity of re-treatment is quantified including intra-procedural hemorrhages and the incidence of new neurological deficits (NND) following re-treatment. *Results:* A total of 17 patients with a previously coiled aneurysm were re-treated for recurrence. The mean size at initial treatment was 10.4 mm. 13/17 (76%) were re-treated at 1 year or before, with a mean time to re-treatment of 17.5 months. Of those re-treated, only 2 patients had had a complete occlusion of their aneurysm following their first treatment with the remainder having residual body (17.6%) and neck remnants (70.5%). An assist device was used in 7/17 (41%) of re-treated aneurysms. The incidence of NND was 2/17 (11.8%) including one intra-procedural rupture and one transient cranial nerve deficit. There were no permanent neurological deficits or mortalities. *Conclusions:* Endovascular re-treatment of previously coiled aneurysms appears to have a similar associated morbidity as established initial treatment estimates.

I-05

The Impact of Assist Devices on Outcomes Following Endovascular Closure of Ruptured Intracranial Aneurysms

C O'Kelly (Toronto), J Spears (Toronto), W Montanera (Toronto), T Marotta (Toronto), C Wallace (Toronto), R Wilinsky (Toronto), K T` erBrugge (Toronto)*

Background: The complexity of aneurysms treated by endovascular methods has increased significantly since the International Study of Aneurysm Treatment (ISAT). Technical advances, in particular the use of assist devices such as stents and balloons, have facilitated this increased role. Whether these devices increase the risk of endovascular therapy, possibly eroding the advantage observed in the ISAT trial, has not been adequately studied. *Methods:* We conducted a retrospective cohort study of patients with ruptured aneurysms treated by endovascular methods at two tertiary Canadian neurosurgical centres between 2002 and 2005. The analysis compared aneurysms coiled with and without an assist device. *Results:* 193 cases of ruptured aneurysms were coiled during the interval studied; assistive devices were used in 43 cases. There was no significant difference in clinically significant complication rates associated with the use of assistive devices (OR 0.68 (0.14-3.26)). Technical complication rates and degree of aneurysm treatment were not significantly affected by assist device use. Neurologic status and the proportion of patients discharged home were similarly unaffected. *Conclusions:* Based on this preliminary experience, there is no statistical evidence to indicate increased risk of complications with the use of assist devices for aneurysm coiling. Further studies, with expanded power to detect small clinical differences, are needed.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

I-06

Synchrotron based k-edge digital subtraction angiography in a pig model: a potentially new diagnostic tool for human neurovascular pathology

L Ogieglo (Saskatoon), E Schültke (Saskatoon), S Fiedler (Hamburg), M Kelly (Stanford), C Nemoz (Grenoble), P Crawford (London), K Meguro (Saskatoon)*

Background: Presently, hospital-based digital subtraction angiography is the gold-standard in the diagnosis of neurovascular pathology. This procedure is associated with a risk of neurologic deficits, 0.5% of them permanent. Most of this risk is associated with the necessity to introduce an intra-arterial catheter to deliver contrast agent close to the target tissue. Following up on our earlier studies in a small animal model, we have now been able to demonstrate that even in a large animal model the need for introduction of an intra-arterial catheter is obviated if synchrotron-based intra-venous K-edge digital subtraction angiography (KEDSA) is used. *Methods:* Four male pigs were used as study subjects, as a model comparable in size to that of human patients. Neurovascular angiographic images were acquired with KEDSA after intravenous administration of contrast agent at the European Synchrotron Radiation Facility in Grenoble, France. *Results:* Resultant images were of similar quality despite differing injection location, including the common carotid artery, jugular vein, and a peripheral vein. Image quality was maintained at radiation doses approved for x-ray imaging in human patients. *Conclusions:* The quality of the images acquired in this study support the idea that synchrotron-based intra-venous KEDSA could be safely used for patients who require more frequent angiographic follow-up studies with a neurovascular pathology that makes them unsuitable candidates for minimally invasive diagnostic methods such as CT or MRI.

I-07

Hemodynamic, pathological, and biochemical changes following stent implantation in a canine experimental aneurysm model

T Darsaut (Montreal), I Salazkin (Montreal), C Ogoudikpe (Montreal), A Boyce (Montreal), G Gevry (Montreal), F Bouzeghrane (Montreal), J Raymond (Montreal)*

Background: Endovascular therapy for intracranial aneurysms is less invasive and better tolerated than surgical clipping. Concerns about durability and the greater incidence of aneurysm recurrence with endovascular therapy has led to interest in the molecular mechanisms surrounding aneurysm treatment. The effects of stents on the molecular events following aneurysm treatment remain unknown. *Methods:* Eighteen beagles underwent surgical creation of bilateral carotid lateral wall aneurysms. After 4-6 weeks, all dogs underwent angioplasty and stenting, with simple angioplasty on the contralateral side. Dogs were sacrificed at 4 hrs, 1 day, 4 days, 7 days, and 14 days post-stent (n=3 per time point). RT-PCR was then used to follow the biochemical profile of tissue at the aneurysm neck and fundus. 3 dogs had their aneurysm constructs removed for pathological and immunohistochemical analysis at 8 weeks post-stent. *Results:* Stenting immediately decreased the amount and rate of contrast opacification of the aneurysm. Stents were well incorporated into the vessel wall, with neointima deposited around the stent struts. Biochemistry results are expected in January 2006. *Conclusions:* Stents alter blood flow dynamics within the aneurysm. Anticipated associated changes in gene expression profile are still pending. Implanted stents do not lead to aneurysm obliteration in all cases.

I-08

Fenestrated Aneurysm Clip Sling in Microvascular Decompression Surgery: Technical Note and Case Series

N Attabib (Winnipeg), A Kaufmann (Winnipeg)*

Objective: To evaluate the use of fenestrated aneurysm clips as microvascular decompression sling in cases of complicated vascular trigeminal and facial nerve compression. *Method and materials:* Retrospective review of microvascular decompression surgeries done using a unique technique in which the culprit vessel was transposed using fenestrated aneurysm clip and secured in position by suturing to the dura. *Results:* Among a consecutive series of over 400 MVD surgeries (AMK), a fenestrated aneurysm clip sling was utilized in eight; six for hemifacial spasm and two for trigeminal neuralgia. The culprit vessel was an ectatic vertebral artery in four cases, and four cases were re- operations. At a period of one to fourteen months the patients had complete resolution of the symptoms and there was no complications. Postoperative imaging with CTA demonstrated effective mobilization and patency of the culprit vessels. *Conclusion:* This approach can be safely conducted in complicated MVD cases such as redo MVD cases and transposing ectetic vertebral arteries. To the best of our knowledge this is the first series describing the use of fenestrated aneurysm clip sling in microvascular decompression surgery.

EPILEPSY, EEG

J-01

Using functional MRI to assess memory in patients with temporal lobe epilepsy

M Tartaglia (London), F Bihari (London), D Lee (London), S Pigott (London), S Mirsattari (London)*

Background: Temporal lobectomy (TLY) is an effective treatment for patients with refractory temporal lobe epilepsy (TLE), but can result in serious memory decline. Adequate presurgical assessment of memory function is critical and functional MRI (fMRI) can be used as a non-invasive alternative to the WADA test in candidates for TLY. *Methods:* FMRI was acquired during a scene encoding memory task in 10 unilateral TLE patients and 15 healthy controls. Laterality index (LI) was calculated for entorhinal cortex (EC), hippocampus (Hp), parahippocampus (APH), all three areas combined and Hp of 15 controls. *Results:* Five patients activated EC, 3 contralateral to seizure focus and 2 ipsilateral. Eight patients had Hp activation, 6 ipsilateral and 2 contralateral. Eight patients had APH activation, 5 contralateral, 1 ipsilateral and 2 bilateral. Combined data revealed activation in at least one area in all; 5 contralateral, 3 ipsilateral and 2 bilateral. There was discordant laterality between the three areas in over 50% of patients. The controls combined, displayed strong

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

lateralization to the right Hp. *Conclusions:* There was heterogeneity of activation in memory regions in TLE patients with tendency to activate side contralateral to seizure focus. Discordant laterality amongst the three areas may have implications for post-surgical results.

J-02

Neurocardiogenic syncope: the frequency and consequences of a misdiagnosis as seizures

C Josephson (Halifax), S Rahey (Halifax), M Sadler (Halifax)*

Background: Neurocardiogenic syncope (NCS) can be mistaken as seizures. We reviewed the frequency and consequences of this misdiagnosis. *Methods:* A retrospective review of outpatient adult epilepsy clinic charts (QEII Health Sciences Centre, Halifax, NS) was conducted to identify NCS patients referred with a provisional diagnosis of seizures. Charts were reviewed in detail with an emphasis on the consequences of misdiagnosis. *Results:* Of 1506 consecutive referrals to the epilepsy clinic, 194 (12.9%) ultimately had a clinical diagnosis of NCS. Mean age was 38 +/- 16 years (mean age of syncopal onset was 28 +/- 16 years). Two-thirds of referrals were from primary care physicians (including emergency departments) and 18% from neurologists. Thirty-five percent were prescribed antiepileptic drugs (AEDs) prior to referral with 8 patients (4.1%) experiencing hypersensitivity reactions. Three of five women had complicated pregnancies while on AEDs. One-third of patients had restrictions placed on their driving privileges while 11 patients (5.7%) had their employment interrupted. Diagnostic modalities used in the work-up included EEG (90%), CT head (51%), and MRI head (15%). *Conclusions:* NCS is commonly misdiagnosed as epilepsy. Some patients had an incorrect diagnosis for > 10 years. Patients with this misdiagnosis are excessively investigated, over-treated, and have inappropriate restrictions placed on driving and employment.

J-03

Convulsive status spilepticus (CSE) - An evaluation of the quality of the medical act

J McDermott (St Laurent), C Deacon (Sherbrooke), C Cieuta-Walti (Sherbrooke)*

Background: CSE is a medical emergency with significant risk of mortality and neurologic sequellae. Prompt treatment may reduce this risk. *Methods:* We designed a protocol for the treatment of CSE according to the recommendations found in the literature and the pharmacological agents that are locally available. The protocol was presented to the emergency, neurology and pediatrics departments of the Sherbrooke University Hospital Centre. A review of 14 episodes of CSE (13 patients) was then performed. The initial management, investigation and use of antiepileptic agents was evaluated. *Results:* Supportive treatment and initial investigations were generally appropriate. In all cases, patients received lorazepam as initial treatment; however, 8 received less than half of the recommended dose and significant delays (>5 min) occurred in 3 cases. Phenytoin was indicated in all 14 episodes and administered in 10. It was administered only after significant delay (>15 min) in 5 cases. Amongst 2 patients who were intubated during CSE, suboptimal treatment was followed by seizure cessation upon administration of induction agents. *Conclusion:* We found a tendency to administer medications below the recommended doses. In some, significant delay occurred prior to treatment. Closer adherence to recommendations is suggested.

J-04

Treating status epilepticus: A preliminary look at a National Survey of Canadian Epileptologists

J Burneo (London), R McLachlan (London)*

Background: Based on recent suggestions from diverse clinical trials that aggressive treatment of status epilepticus (SE) may improve prognosis, we surveyed Canadian epileptologists, with the idea to evaluate practices and try to establish some user-friendly recommendations. *Methods:* We mailed a questionnaire on the treatment of different epilepsy syndromes as well as on treatment of status epilepticus, to all epileptologists in Canada. Adult and pediatric epileptologists were identified from the CLAE and CCNS membership lists. Physicians were asked to rate treatment options based on a 5-point scale ("1"=most appropriate to "5"=harmful). The responses were anonymously collected. *Results:* Of the 64 Canadian epileptologists to whom the survey was sent, the preliminary look is done based on 28 responses (44%). For initial treatment of status epilepticus, IV lorazepam was rated as first treatment of choice ($p<0.05$), followed by phenytoin. As second line, in case of failure of an initial dose of IV lorazepam, phenytoin and a second dose of IV lorazepam were rated as treatment of choice. *Conclusions:* This method concisely summarizes expert opinion, which may be helpful in situations in which the medical literature is scant or lacking. This information should be evaluated in conjunction with evidence-based findings.

J-05

The neuropsychological impact of Temporal Lobe Surgery after Sodium Amobarbital Failure

W Hader (Calgary), A Olivier (Montreal), M Jones-Gotman (Montreal), F Andermann (Montreal), V Szikilas (Montreal)*

Failure of the sodium amobarbital memory test (IAP-M) in patients with temporal lobe epilepsy on the side of proposed resection is felt to identify patients at high risk for the development of severe postoperative amnesia after temporal lobe surgery. The purpose of the study was to assess the neuropsychological impact of temporal lobe surgery in patients after failure of IAP-M. Patients were identified from databases at the Montreal Neurological Hospital who had a temporal lobe resection after failure of sodium amobarbital on the side of proposed resection. Results of IAP and pre and post operative assessment of intelligence, language, verbal and visual memory was completed. The surgical procedure performed and the extent of hippocampal resection was recorded. Seizure outcome was classified according to Engel. A total of 35 patients were identified, 13 with failure of IAP-M on the side of resection alone and 22 with bilateral failure prior to surgery. Twenty-four patients had operations on the left and 11 on the right. Seven patients underwent corticoamygdalectomy with complete sparing of the hippocampus,

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

while 27 had either selective or standard temporal resections including removal of 0.5-3.5 cm of the hippocampus (mean 2.2 cm). Forty per cent of patients were seizure free at last follow up. One patient developed a transient severe postoperative amnesia but returned to baseline on subsequent follow up. Modality specific declines in memory were identified in over one half of the patients Severe postoperative amnesia is a rare consequence of temporal lobe surgery including resection of mesial temporal lobe structures despite failure of preoperative sodium amobarbital memory testing. Limited resections of mesial temporal structures although safe results in less favourable seizure outcomes.

J-06

Multimodality imaging of epileptic malformations of cortical development

J Burneo (London), W Vezina (London)*

Background: Malformations of Cortical Development (MCD) are responsible for 40% of the medically-refractory epilepsies. In the present study we performed a preliminary look at data from a large project studying different imaging technologies in the presurgical evaluation of patients with intractable partial epilepsy and MCD. *Methods:* Six patients undergoing presurgical evaluation were evaluated with different neuroimaging modalities: Anatomical MRI (1.5-3.0 T), using a standardized protocol optimized for epilepsy; SPECT performed with injections at seizure onset, and in the interictal state of 20-40 mCi of [99mTc]-hexylmethylene phenyloxaloacetae (HMPAO); MRS was performed using single- or multi-voxel analysis; and fMRI evaluated location of sensorimotor cortices. *Results:* The mean age was 27.7 years (range: 20-35, 2 females). One patient had polymicrogyria with schizencephaly, one only polymicrogyria, three subcortical heteropia, and one cortical dysplasia. All MRI confirmed presence of MCD, SPECT was positive in all patients. Only one patient so far has undergone surgical resection after ictal SPECT and MRI had concordant information, subsequently confirmed with intracranial evaluation, and has been seizure free for the last 8 months. *Conclusion:* In this observational study, multimodality imaging showed a more complementary than redundant effect on presurgical evaluation and surgical decision-making. Combined multimodal imaging provides more information than does any single modality in MCD.

J-07

Validation of a 4 channel EEG monitor in the ICU

B Young (London), M Sharpe (London), M Kelly (London)*

Background: Continuous EEG (CEEG) monitoring is essential in detecting nonconvulsive seizures in comatose ICU patients. With a continuous 4 channel EEG monitor and a subhairline montage, prompt CEEG monitoring for high risk patients is feasible. However, this new technology needs to be validated for its ability to detect seizures. Methods: 38 high risk ICU patients were simultaneously and continuously monitored with both a standard 16 channel EEG monitor (gold standard) and a 4 channel EEG monitor and subhairline montage for 48 hours. CEEGs were interpreted independently of each other; 4 channel recordings assigned a number so that the patient's names were not known at the time of interpretation. Each recording was classified as containing a seizure or not. *Results:* The sensitivity and specificity of the 4-channel monitor for detection of all seizures (generalized and focal combined) was 0.9 and 0.996, respectively. The sensitivity/specificity for the detection of generalized spike waves, focal spikes, and burst suppression were 0.75/0.94, 0.43/0.67and 0.41/0.91, respectively. Conclusions: The 4-channel EEG module with a subhairline montage provides a safe, user-friendly, convenient and sensitive monitor to detect seizures in high risk patients

J-08

Rhythmic Artifact of Physiotherapy (RAP) in ICU EEG Recordings

B Young (London), S Raihan (London), H Ladak (London), M Kelly (London)*

Background: Continuous EEG (CEEG) recordings in ICU often contain artifacts that can be misleading, especially in the absence of an EEG technologist to document possible causes. We have recently recognized a curious rhythmic artifact produced by chest physiotherapy (RAP). We have subsequently studied RAP in greater detail. Methods: Chest percussion produced manually (at different rates) or by a mechanical vibrator were studied using both standard and quantitative (power spectral analysis) EEG techniques on 4 comatose ICU patients. Results: Mechanical vibrators produce a high frequency simple artifact, while manual physiotherapy produces a lower frequency rhythmic artifact that contains higher harmonic frequencies. Both are distinctive and easily recognized. Conclusion: RAP is a prominent and distinctive artifact on ICU CEEG recordings. Manual and mechanical vibrators produce different frequency spectra.

General Neurology

K-01 *K.G. McKenzie Memorial Prize winner*
Basic Neurosciences

p63 is an essential proapoptotic protein during neural development

W Jacobs (Toronto), F Miller (Toronto), D Kaplan (Toronto)*

Background: During development, the nervous system eliminates, via apoptosis, those neurons that do not successfully reach target connections. Following nervous system injury, apoptosis occurs as a mechanistic recapitulation of developmental neuronal apoptosis. A better understanding of this process will improve our ability to design neuroprotective therapeutics. Here, we define a proapoptotic role for the p53 family member, p63, during developmental neuronal death. *Methods:* To investigate p63 in apoptosis, cell biological and biochemical techniques were employed on mice with deletions of p63, p53, and Bax. *Results:* Sympathetic neurons express TAp63 during development, and TAp63 levels increase following NGF withdrawal. Overexpression of TAp63 causes apoptosis, while cultured p63-/- neurons are resistant to apoptosis following NGF withdrawal. p63-/- mice also display an in vivo deficit in sympathetic neuron death. While both TAp63 and p53 induce similar apoptotic

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

proteins, TAp63 induces neuronal death in the absence of p53, but p53 requires p63 expression to promote apoptosis. *Conclusions:* In summary, we define a novel proapoptotic protein, TAp63, which is essential for developmental neuronal death. This model may extend to the injured nervous system, making p63 a novel target for neuroprotective strategies.

K-02

CACNA1A gene mutations cause Familial Hemiplegic Migraine and Episodic ataxia type 2: What determines phenotype?

P Adams (Vancouver), E Garcia (Vancouver), T Snutch (Vancouver), S Spacey (Vancouver)*

Objective: To determine how globally expressed mutations result in specific phenotypes *Background:* The CACNA1A gene codes for the α1A subunit of the P/Q type calcium (Ca) channel which is expressed throughout the brain. The K1336E mutations in the CACNA1A gene causes familial hemiplegic migraine (FHM). Despite the wide expression of the K1336E mutation these patients do not have ataxia. There are many α1A splice variants, including a short and a long variant differentially expressed throughout the brain. We hypothesize that the localized manifestation of the disease results from different biophysical properties of the K1336E mutation when expressed in different isoforms. *Design/Methods:* Channel biophysical properties were studied using the whole cell patch clamp technique to record macroscopic currents in HEK cells expressing wild-type and K1336E mutant channels in both the long and short α1A splice variants. *Results:* Our results show significant difference in current decay ($p<0.001$) between K1336E and wildtype in the short isoform, but no significant difference when compared in the long isoform. *Conclusion:* The K1336E mutation associated with FHM results in different biophysical properties that are dependent upon a particular P/Q-type channel splice variant. These different properties may explain how a globally expressed mutation can appear to have a localized effect.

K-03

Demographic and headache clinical features predicting depression in patients referred to headache specialists in Canada

W Becker (Calgary), S Jelinski (Calgary), J Magnusson (Auckland), S Christie (Ottawa), R Giammarco (Hamilton), G Mackie (Richmond), M Gawel (Toronto), A Eloff (Calgary)*

Background: Depression is a significant co-morbidity of several headache types, including migraine. Our objective was to evaluate the predictive relationships between selected demographic characteristics and clinical features in headache patients and the presence of depression. *Methods:* At the time of consultation, demographic and clinical data were collected for 712 new headache patients referred to five headache-specialty clinics in Canada. The data were analyzed as part of the Canadian Headache Outpatient Registry and Database (CHORD) Project. The Beck Depression Inventory (BDI-II) was used to determine the presence or absence of depression. Multivariable logistic regression analysis was employed to evaluate associations between gender, age, marital status, employment status, diagnosis, headache days per month, medication overuse, headache impact (HIT-6), and headache disability (MIDAS) and the presence of depression as measured by the BDI-II. *Results:* Fifteen per cent (n=110) of the headache patients had moderate to severe depression. Factors which predicted depression included age less than 30 years, being unemployed, on disability pension or welfare, a diagnosis of transformed migraine or headache associated with trauma, and being severely disabled as measured by the MIDAS. *Conclusions:* Specific demographic and clinical factors increase the likelihood of significant depression among headache patients.

K-04

A Systematic Review of Secondary Cluster Headache

D Cadotte (Toronto), R Kern (Toronto)*

Background: Cluster headache (CH) is a well-recognized form of primary headache (ICHD-II). It is not clear to what extent CH may be related to an underlying structural lesion. To address this question, we performed a systematic review of CH. *Methods:* We conducted an OVID-MEDLINE (1980 to October Week 1 2005) search of English language case reports using 'cluster headache' as a MeSH and keyword. The authors (DC and RK) independently reviewed 317 case reports according to the following criteria:

1. clinical history sufficient to consider a diagnosis of CH using ICHD-II criteria
2. neuroimaging studies to provide evidence of a potential secondary cause of CH

Results : 50 cases met the above criteria. 38 of these fulfilled ICHD-II CH diagnostic criteria and demonstrated a structural lesion that represented a potential secondary cause. Of the 38 cases, 29 (76%) displayed additional neurological abnormalities on history or physical examination that led to the search for a secondary cause. Of the remaining 9 cases (24%), 5 responded to CH medical treatment prior to the discovery of a secondary cause. *Conclusions:* We propose that the presence of additional neurological features or lack of response to medical treatment should prompt a search for a secondary cause of CH.

K-05

Migraine prevalence, disability, and treatment: Canadian women and migraine survey 2005

L Cooke (Calgary), W Becker (Calgary)*

Background: Migraine is a common cause of disability, particularly among women. *Methods:* A standardized population-based national telephone survey was carried out in Canada for women over age 18 on behalf of Headache Network Canada. Responses were obtained from 1210 women. Response rate was 41.8%. *Results:* Twenty-six percent of all women in the survey met IHS 2004 diagnostic criteria for migraine. Only 51% of these had ever consulted a physician for their migraine. Thirty-five percent of women with migraine took a prescription medication for their headaches. Only 8% of the migraineurs were taking a triptan, even though 25%of women with migraine indicated that they were usually

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

unable to function normally two hours after taking their medication. Sixty-one percent of women with migraine said they coped with their attacks by staying in bed until it was over. On average, women with migraine experienced 21 days a year during which they missed some work, or had difficulty doing housework or caring for children. *Conclusions:* This recent Canadian study confirms that migraine is very common among women, and causes very significant disability. Triptans appear to be greatly under-utilized. Approximately half of the women with migraine rely primarily on non-prescription medication.

K-06

Triptan preference in acute migraine management

A Bellavance (Longueuil), J Belsey (Little Cornard)*

Background:
Initial treatment choice in the migraine patient is determined by perceptions of relative efficacy and tolerability, derived from randomised controlled trials. These results, however, do not reflect current trends towards early treatment. The objective of this study was to characterise triptan preference when used early in a triptan-naïve population. *Methods:* All new triptan-naïve migraine patients presenting to a Canadian headache clinic over a 3 year period were given a selection of triptan samples to evaluate. Having tried all samples, they then chose which triptan they wished to continue and notified the clinic. This paper presents a retrospective analysis of their preferences, based on the choices available to them. *Results:* 22.6% of 1158 new patients were triptan naïve. Of these, 79.8% elected to remain on a triptan after a therapeutic trial. More patients preferred sumatriptan 100 mg and rizatriptan 10 mg than would have been expected by chance, while fewer preferred zolmitriptan 2.5 mg, naratriptan 2.5 mg or non-triptan options. The overall trend was statistically significant ($X2 = 16.63$, $p<0.05$), although individual comparisons between agents were generally non-significant, due to limited numbers of patients. *Conclusions:* When triptans are used to treat migraine early, their therapeutic performance does not necessarily match that expected from the clinical trials evidence-base. It may therefore prove preferable to re-determine patient preference profiles based on clinical experience

K-07

Vertebrobasilar dolichoectasia, anticoagulation, and the role of gradient echo imaging

E Atkins (Saskatoon), C Voll (Saskatoon), D Fladeland (Saskatoon), J Donat (Saskatoon)*

Background: This study was designed as a quality assurance project to investigate the safety of anticoagulation therapy for stroke prophylaxis in patients with vertebrobasilar dolichoectasia utilizing gradient echo magnetic resonance (GEMR) imaging to screen for pre-existing micro-hemorrhages. *Methods:* GEMR imaging was obtained on eight patients with known vertebrobasilar dolichoectasia identified by cranial computerized tomography. The imaging was examined by a radiologist for the presence of intraparenchymal hemosiderin deposits indicative of prior micro-hemorrhages. *Results:* One of eight patients demonstrated evidence of previous micro-hemorrhages; all patients demonstrated evidence of marked leukoariosis. *Conclusions:* Most patients with dolichoectasia do not show any evidence of previous micro-hemorrhages, suggesting that there is no shared pathology between the dolichoectatic vertebrobasilar system and the small vessel fragility that leads to micro-hemorrhage. It is unlikely that the use of anticoagulation for ischemic stroke prophylaxis in patients with dolichoectasia is placing them at unusually higher risk of iatrogenic brain hemorrhage. The use of GEMR as a screening tool prior to starting anticoagulation therapy in this population is not a justifiable use of resources. The finding of a high association between vertebrobasilar dolichoectasia and leukoariosis suggests that there may be a shared pathophysiology between these two diseases which warrants further explanation.

K-08 *Frances McNaughton Memorial Prize winner - CNS*

Smooth Ocular Pursuit in Spina Bifida and Chiari Type II Malformation

M Salman (Winnipeg), J Sharpe (Toronto), L Lillakas (Toronto), M Steinbach (Toronto), M Dennis (Toronto)*

Background: Chiari type II malformation (CII) is a congenital anomaly of the cerebellum and brainstem, both important structures for processing smooth ocular pursuit. CII is associated with spina bifida and hydrocephalus. We measured smooth ocular pursuit in CII, and investigated effects of spinal lesion level, shunt revisions, nystagmus, and brain dysmorphology on smooth pursuit. *Methods:* Smooth pursuit was recorded using an infrared eye tracker in 21 participants aged 8-19 years with CII. Thirty-eight healthy children constituted the control group. Participants followed a visual target moving sinusoidally at ±10º amplitude, horizontally and vertically at 0.25 or 0.5 Hz. *Results:* Smooth pursuit gains, the ratio of eye to target velocities, were subnormal in the CII group with nystagmus (N=8) but normal in the group without nystagmus (N=13). The number of shunt revisions, brain dysmorphology on MRI, or spinal lesion level did not correlate with smooth pursuit gains. *Conclusions:* Smooth pursuit is impaired in children with CII and nystagmus. Subnormal pursuit might be related to the CII dysgenesis or to remote effects of hydrocephalus. The lack of effect of shunt revisions and the subnormal tracking in subjects with nystagmus provide evidence that it is primarily related to the cerebellar and brainstem malformation.

NEURO-ONCOLOGY

L-01

Identification of human brain tumour initiating cells

*P Dirks**

The Royal College of Physicians and Surgeons of Canada Gold Medalist in Surgery (2005) Winner.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

L-02

Radiation exposure to the cochlea during fractionated stereotactic radiotherapy for vestibular schwannoma: implications for hearing preservation

S Di Maio (Vancouver), B Toyota (Vancouver), R Ma (Vancouver), B Clark (Vancouver), M McKenzie (Vancouver), E Vollans (Vancouver)*

Background: We analyzed our series of vestibular schwannomas treated with LINAC fractionated radiotherapy (SRT) to determine whether radiation exposure to the cochlea affected hearing outcome. *Methods:* 21 patients with vestibular schwannomas who received SRT were included in our study. Patients were treated with 45 Gy in 25 fractions, prescribed to the 90% isodose line at the tumour edge. The median cochlear volume exposed to the 90% tumour isodose (V90) was tested as a prognostic factor. Mean follow-up length with pure tone audiograms (PTA) was 48.1 months. *Results:* Median V90 for the entire cohort was 72.7%. Patients with V90 ≥72.7% performed substantially worse on the follow-up PTA (25.3 dB) compared to patients with a V90 <72.7% delivered to the cochlea (9.3 dB; P=0.055). Similarly, patients with minimum cochlear doses <60% (i.e., the median) had better hearing outcomes compared to ≥60% (5.3 vs. 25.6 dB, respectively; P = 0.013). These findings were not secondary to differences in tumour size or follow-up length. *Conclusion:* Increased radiation exposure to the cochlea may be related to the decline in hearing following SRT for vestibular schwannomas. This may have implications on future radiotherapy planning protocols and hearing preservation.

L-03

Paediatric glioblastoma involve unique molecular events and are biologically distinct from adult glioblastoma

D Faury (Montreal), S Albrecht (Montreal), M Guiot (Montreal), R DelMaestro (Montreal), A Nantel (Montreal), N Jabado (Montreal)*

Background: Because they share similar histology, pediatric glioblastoma (pGBM) is considered similarly to adult GBM (aGBM), with little therapeutic success. Despite the considerable information currently available on aGBM, the molecular pathogenesis remains elusive in children. *Methods:* Our premise is that pGBM involve unique molecular events. To this end, we investigated 32 primary pGBM samples. We assessed activation of Ras and Akt pathways in samples through investigating the phosphorylation of their downstream effectors and examined the tumoral transcriptome by gene expression profiling of messenger RNA extracted from the same samples. We performed gene expression profiling on aGBM tumors for a comparison of expression profiles obtained from pediatric and adult GBM. *Results:* We show that the Ras pathway, which is aberrantly active in most aGBM, is not active in one third of pGBM, and that Ras activation is associated with a poorer outcome in children. Gene expression profiling distinguished two different subtypes of pGBM also based on Ras activation, demonstrated that both have markedly different molecular profiles from aGBM and identified potential targets in pGBM. *Conclusion:* We conclude that pGBM involve unique molecular events and cannot be understood through the study of aGBM. Our findings provide insight into pathways and targets in pGBM and are of therapeutic impact in a cancer where survival is minimal.

L-04

Characterization of the Blood brain barrier disruption procedure with the use of high field MRI

D Fortin (Sherbrooke), M Blanchette (Sherbrooke), M Lepage (Sherbrooke), M Pellerin (Sherbrooke), L Tremblay (Sherbrooke)*

Background: One of the reasons limiting the efficacy of chemotherapy in the treatment of malignant gliomas is the impediment in delivery caused by the blood brain barrier (BBB). One strategy to circumvent the barrier is the osmotic opening of the BBB (BBBD). The exact process and physiology of the procedure have not been detailed. This study was initiated with the goal of characterizing spatially and temporally the BBBD procedure with MRI. *Methods:* A technique was devised so the BBBD procedure could be accomplished while the animal was positioned in a 7 Telsas animal scanner. Images were acquired before, during and after the procedure. BBBD was performed in 24 Wistar rats. At a selected time after BBBD, a bolus of Gd-DTPA was injected i.v. . T1-weighted images were acquired 2 minutes prior, and periodically following the procedure, up to 2 h. *Results:* Mathematical analysis of the enhancement patterns was performed to extract the rate of perfusion and the amplitude of signal enhancement. We observed a 3-fold increase in the brain parenchyma, and a 5-fold enhancement in the basal ganglia region. The Gd-DTPA remained in the brain parenchyma for extended period of time (> 2 h). *Conclusion:* These results demonstrate the efficacy of the procedure to increase the BBB permeability allowing the accumulation of a small molecule in the brain parenchyma.

L-05

Determination of Human Brain Tumour Therapy Response using an Ex Vivo Invasion Assay - a Potential Step toward Individualized Treatment

P Costello (London), W Mcdonald (London), D Macdonald (London), R Hammond (London), J Megyesi (London)*

Malignant brain tumours are the 6th leading cause of pre-mature death in Ontario with over 10,000 potential years of life lost each year. Improved treatment for malignant brain tumours is needed. Models assessing chemotherapy response employ clonal malignant human tumour cells while patient responses are heterogeneous. Tumour spreading is dependent on invasion and in this study, a surgical sample of each patient's tumour was used to assess invasion and growth while exposed to a panel of clinically relevant chemotherapies. Tissue specimens were placed into a nutrient-rich collagen gel that mimics the tumour environment in the body. Chemotherapy treatments were suspended in the matrix surrounding the tumour. Growth and invasion in the presence of chemotherapies was assessed for 5 days following surgical removal in this 3 dimensional matrix and compared to control conditions using student t- test. 12 patient's individual tumour response was assessed. 4 patients tumours did not respond to any chemotherapy tested. Respnse to Temozolomide, Procarbazine, Vincristine and Cisplatin was seen in 25 % of tumours tested. Individual response to chemotherapy is highly variable both clinically and in our ex vivo assessment of tissue fragments. Several patients (8/12 or 67%) tumour assessment displayed significant (p<.05) response to one or more therapies. The overall predictive value of the data obtained

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

using this ex vivo model will be determined by continuing to collect information from approximately 90 solid tumour patients per year. Pre-assessment of each patient's responsiveness to a number of chemotherapies could lead to more individualized and therefore more effective treatment.

L-06

Neurological toxicity from stereotactic radiosurgery in patients treated for brain metastasis located in functional areas

M Barkati (Montreal), C Lambert (Montreal), A Bouthillier (Montreal), M Fortin (Montreal), J Bahary (Montreal), R Moumdjian (Montreal)*

Background: Even if the efficacy and safety of stereotactic radiosurgery (SRS) are well established, its toxicity for specific target location has not been well defined. In this study we evaluated the neurological toxicity following SRS for brain metastasis located in functional areas. *Methods:* We retrospectively reviewed all patients treated with SRS between January 2001 and December 2005 in our center. We identified 39 patients with 42 brain metastasis located in eloquent cortex. Functional areas were anatomically defined using CT imaging or MRI. *Results:* Median follow-up was 5 months. Eighty-eight percent were previously treated with whole brain radiotherapy. Data were available in thirty-five lesions for neurological function evaluation. Twenty-six (74.3%) metastasis in 24 patients showed improvement or stability in neurological function following SRS, and 9 (25.7%) showed deterioration (3 without any radiological progression, one of them had confirmed radiation necrosis). *Conclusion:* SRS for brain metastasis located in eloquent cortex appears to be safe and could be proposed as an alternative to surgery if surgical risk is high.

L-07

Combined green tea-derived epigallocatechin-3-gallate and low dose ionizing radiation treatments induce necrosis in human brain endothelial cells

N McLaughlin (Montreal), B Annabi (Montreal), J Bahary (Montreal), R Moumdjian (Montreal), R Béliveau (Montreal)*

Introduction: The microvasculature of brain tumors has been proposed as the primary target for ionizing radiation (IR). The contribution of IR-induced non-apoptotic cell death pathways such as necrosis has not been studied. The goal is to characterize the effect of IR on human brain microvascular endothelial cells (HBMEC) and determine whether epigallocatechin-3-gallate (EGCg), a green tea-derived anti-angiogenic molecule, can augment this effect. *Methods and Results:* HBMEC were treated with 10mM EGCg, irradiated with a sublethal (≤10Gy) single dose and left to recuperate for 48 hours. Low IR doses reduced cell survival by 30%. In EGCg pretreated-cells, IR was more effective reaching 70% cell death. The synergistic reduction of cell survival was not related to increased caspase-3 activity or increased expression of caspase-3, caspase-9 and cytochrome C. Random DNA fragmentation documented in the sub-G1 region increased by approximately 40% following combined EGCg/IR treatments. Double-staining assay for Annexin-V and propidium iodide using flow cytometry showed that cell necrosis increased five-fold following combined EGCg/IR treatments while no changes in apoptosis were observed. *Conclusions*: The synergistic anti-survival effects of combined EGCg/IR treatments may be related to necrosis. Strategies that sensitize brain tumor-derived EC to IR may further enhance the efficacy of radiotherapy.

L-08

Functional magnetic resonance imaging of patients with a malignant brain tumor in an eloquent language area

M Raja (London), S Mirsattari (London), L Jong (London), F Bihari (London), D Lee (London), J Megyesi (London)*

Background: Functional magnetic resonance imaging (fMRI) provides a non-invasive method of mapping cortical function. While in an MRI scanner, patients typically perform language or motor tasks, thus elucidating specific patterns of activation. In the current study, the effects of left-sided tumours in Wernike's and Broca's areas (language production and comprehension areas respectively) on activation patterns were investigated. *Methods:* Activation patterns of 9 right-handed patients with lesions in language areas were compared to 14 right-handed control subjects during two fMRI language paradigms: sentence completion and verb generation. Laterality index (LI) was calculated as the ratio of the total voxels of activation in the regions of interest in the left hemisphere minus the right divided by the total voxels of activation. LI=0 indicated symmetric activation with LI<-0.5 indicative of left hemisphere dominance and LI>+0.5 of right hemispheric dominance. *Results:* For sentence completion, average LI=0.05 (patient group) vs. LI=-0.516 (control group). For verb generation, average LI=-0.159 (patient group) vs. LI=-0.562 (control group). *Conclusions:* During language paradigms, control subjects showed more left-sided brain activation while tumour patients showed more bilateral language activation. This suggests that the contralateral side of the brain is capable of picking up lost function due to a lesion in eloquent language areas.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

POSTER PRESENTATIONS

CEREBROVASCULAR SURGERY

P-001

Decompressive Bifrontal Craniectomy for Malignant ICP

J Scozzafava (Edmonton), P Brindley (Edmonton), V Mehta (Edmonton), J Findlay (Edmonton)*

Background: Occasionally generalized bifrontal brain swelling can occur following anterior communicating artery (ACommA) aneurysm rupture, causing raised intracranial pressure (ICP) that is difficult to control. We present two such patients that were successfully managed with large bifrontal decompressive craniectomies. *Patients:* Both were young men with severe subarachnoid hemorrhages (SAHs) (in one case recurrent) who experienced markedly elevated ICPs following aneurysm repair (one coiled and one clipped) that failed to respond to maximum medical treatment including ventricular drainage, osmotherapy with mannitol infusions, and continuous sedation, analgesia and muscle paralysis. In both bifrontal cerebral edema appeared to be the underlying cause based on CT scanning, without signs of irreversible infarction. In both patients prompt decompressive bifrontal craniectomy and expansion duroplasty resulted in a prompt and sustained reduction of ICP, and both patients went on to make good recoveries. *Conclusion:* In the setting of ACommA aneurysm rupture and brain swelling not due to infarction causing dangerous ICP elevation refractory to ventricular drainage and medical treatment surgical decompression with a bifrontal craniectomy can greatly assist ICP control and thereby contribute to satisfactory clinical recovery.

P-002

Granulomatous angiitis associated with cerebral amyloid angiopathy: a case report

S Yip (Vancouver), S DiMaio (Vancouver), I Mackenzie (Vancouver), W Moore (Vancouver), M Heran (Vancouver), D Graeb (Vancouver), E Kavanagh (Vancouver), S Yip (Vancouver), P Smyth (Vancouver), H Feldman (Vancouver)*

Background: Cerebral amyloid angiopathy (CAA) is a common pathology in the elderly. Rarely, it has been associated with granulomatous angiitis (GA). The relationship of GA and CAA is not well understood. *Methods:* We report a case of GA associated with CAA (GA/CAA) presenting as diffuse leukoencephalopathy in a patient with a prior diagnosis of CAA. *Results:* A 67-year-old right handed woman presented with intracranial hemorrhage in 2001. At that time, a diagnosis of CAA was made based on the clinical, radiological and pathological features. In 2004, the patient presented with a 3 week history of progressive decline in cognitive function and a mild headache. Clinical examination showed a non-fluent aphasia, perseveration, short-term memory impairment, acalculia, and grossly abnormal clock-drawing. MRI showed extensive white matter hyperintensity involving the u-fibers of the temporal, parietal and occipital lobes on T2WI. An open brain biopsy of the right temporal lobe was performed. Histopathological examination was consistent with a diagnosis of GA/CAA. The patient was treated with one gram of intravenous solumedrol for 5 days and has a significant improvement clinically. *Conclusions:* This is the first reported case of CAA with tissue specimen and imaging before and after the development of GA, suggesting that the angiitis may be secondary to amyloid deposition.

P-003

Does the modality of treatment for ruptured aneurysm in the presence of early angiographic vasospasm influence clinical outcome and treatment results?

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

Background: Angiographic vasospasm (AVS) occurring within 48 hrs after aneurysmal subarachnoid hemorrhage (SAH) has been associated with poor outcome. We wanted to determine if the modality of treatment in the presence of early AVS influences results and outcome. *Methods:* Retrospective study between 1990-2004 of aneurysmal SAH with early AVS treated by clipping or coiling. Functional outcome was assessed 3 months after SAH using the GOS. *Results:* Early AVS was diagnosed in 12 patients treated surgically and 9 endovascularly. Mean age was 51 vs 61 and poor clinical grade in 33% vs 55% in surgical and endovascular group respectively. Clinical VS before treatment was diagnosed in 2 patients of each group. All aneurysms operated were excluded. Residual necks (50%) and aneurysms (12.5%) persisted following embolization. VS-related infarcts were diagnosed in 3 patients of each group following treatment. In both groups, functional outcome was favorable in 75%. All deaths were VS-related except one due to rebleeding. Two asymptomatic vessel occlusions occurred in the endovascular group. *Conclusion:* In this series there is no significant difference in the incidence of infarction and clinical outcome between treatments although incomplete aneurysm exclusion and vascular occlusion occurred more frequently following embolization.

P-004

Analysis of associative parieto-temporo-occipital area by diffusion tensor imaging

J Bérubé (Montreal), N McLaughlin (Montreal), P Bourgouin (Montreal), G Beaudoin (Montreal), M Bojanowski (Montreal)*

Background: Conventional imaging displays intertwined fibers of the cerebral white matter as an homogenous substrate. Recently, diffusion tensor imaging (DTI) allowed a 3D reconstruction of these bundles. The goal of this study is to analyse how these fibers' course is modified by an AVM. *Methods:* Seven patients harbouring an AVM in the parieto-temporo-occipital (PTO) associative area were investigated with a 1.5 Tesla equipment. DTI acquisition data resulted in vectors generating a directional color map. The arcuate fasciculus (AF), the occipito-frontal fasciculus (OFF), and the inferior longitudinal fasciculus (ILF) associative fibers of the PTO of the affected hemisphere were compared to the controlateral

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

corresponding bundle. *Results:* 3D representation of the normal PTO fiber bundles were compared to the controlateral bundles of the affected hemisphere. Based on the AVM location, a pattern could be established. Although the AF is spared in occipital AVMs, it is frequently affected in temporal AVMs. The OFF and ILF were thinned and interrupted respectively in temporal and occipital AVMs. *Conclusion:* DTI can image fiber bundle modifications occurring in the presence of AVMs. Specific patterns may be observed according to the AVMs' location. In the near future, these findings might lead to clinical and surgical applications.

P-005

Bilateral infraoptic course of the anterior cerebral artery associated with abnormal gyral segmentation in a patient with an anterior communicating artery aneurysm

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

Introduction: Infraoptic course of the anterior cerebral artery (ACA) is a rare anatomical variant exceptionally present bilaterally. It is result of abnormal embryogenesis of the anterior circle of Willis. Associated abnormal gyral segmentation has not been reported. *Methods:* Case report and review of the literature. *Results:* A 34 year-old female presented with increasing spells of ophthalmic migraine for the last 6 months. MRA and conventionnal angiography revealed the presence of a large neck multilobulated anterior communicating artery (AcoA) aneurysm with bilateral ACA originating immediately distal to the ophthalmic artery. The aneurysm was surgically approached. Both ACA were found originating below the optic nerve, coursing medially to them to reach the medial aspect of the frontal lobe. There was an associated abnormal segmentation of both gyri recti. The surgery was uneventful and the patient was discharged 5 days post-operatively. *Conclusion:* Bilateral infraoptic course of ACA is rare and might be associated with abnormal gyral segmentation. Pre-operative recognition of this vascular anomaly and its possible associated gyral abnormalities is relevant for surgical exposure and aneurysm clipping.

P-006

Intracranial arteriovenous fistula and dementia

P Khoueir (Montreal), M Bojanowski (Montreal)*

Background: The clinical course of dural arteriovenous fistula (DAVF) is related to its location and venous drainage. Although, hemorrhage is its most frequent clinical manifestation, in rare cases dementia may occur. *Methods:* We reviewed the literature of DAVF presenting with dementia, to which we added our experience of two patients. We analysed epidemiological, clinical and radiological data in order to determine significant prognostic factors. *Results:* Thirty patients were included in our review. Two types of parenchymal anomalies were associated with dementia: 1) Subcortical white matter lesions (16) of which 14 were primarily due to right or bilateral transverse sinus occlusion; 2) thalamic lesions of which all were secondary to straight sinus occlusion. Of patients with transverse sinus occlusion, 75% presented a symptomatology lasting more than two months while all patients with straight sinus occlusion had a more rapid deterioration. Outcome was favorable in 90% with complete cure of the fistula and in only 11% in patients with partial treatment, independently of fistula's location and symptom duration before treatment. *Conclusion:* DAVF can manifest as dementia due to white matter or thalamic lesions following a transverse or straight sinus occlusion respectively. Complete cure of the fistula represents the most important prognostic factor.

P-007

Brain stem infarction from intracranial dural arteriovenous fistula

F Maroun (St. John's), G Murray (St. John's), R Avery (St. John's), A Engelbrecht (St. John's), N Hache (St. John's), P Bartlett (St. John's), C Go (St. John's)*

Background: Intracranial dural arteriovenous fistulas with spinal perimedullary venous drainage usually present with myelopathy or subarachnoid hemorrhage. Sudden ischemia and infarction of the brain stem, is an extremely rare occurrence. *Methods:* A 33 year old man developed sudden onset of dizziness, nausea and vomiting followed by decrease level of consciousness over a 12 hour period. Within a few hours after admission, difficulty swallowing with rapid respiratory failure occurred. He complained of thickness of his tongue, numbness and weakness of left leg and right arm and leg. Nystagmus was evident on lateral gaze with weakness of pharyngeal muscle. He was drowsy but easily arousable. MRI revealed ischemia of the lower pons, medulla and upper cervical cord. Intradural intracranial dural AVM was diagnosed on MR and angio. *Results:* Arterial embolization of feeding vessels followed by surgical removal of the nidus was performed. Neuroimaging revealed complete disappearance of the fistula with slow clinical improvement. *Conclusions:* Brain stem ischemia and infarction can occur from the dural AVM with spinal perimedullary venous drainage.

P-008

Aggressive Conversion of Benign Intracranial Dural Arteriovenous Fistulas (DAVFs): a Series Analysis and Review of the Literature

J Coret-Simon (Hamilton), P Klurfan (Toronto), M Peruzzo dos Santos (Toronto), R Willinsky (Toronto), K TerBrugge (Toronto)*

Background: Intracranial dural arteriovenous fistulas (DAVFs) can be classified according to their venous drainage using the Borden classification. Most Borden type I fistulas have a benign natural history, whereas types 2 and 3 have a high risk of morbidity and mortality. A 2% rate of conversion from benign to aggressive DAVFs has been described. The aim of this study was to review such cases and to analyze their characteristics and coexisting factors. *Methods:* The database of the University of Toronto Brain Vascular Malformation Study Group was review to identify DAVFs type I that converted into aggressive types. The patients' characteristics, previous treatment and angioarchitecture were analyzed. *Results:* Four cases were identified. One patient had previous endovascular treatment, two patients had undergone previous intracranial procedures and one patient had coexisting autoimmune disorder. *Conclusion:* Previous intervention or coexisting clinical conditions such as autoimmune disorders may predispose patients with benign DAVFs to conversion into aggressive types.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-009

Aneurysm morphology as an indicator of aneurysm obliteration

D Sinclair (Montreal)*

Background: In deciding whether or not an aneurysm will accept and hold a coil during an embolization procedure the aspect ratio is often used. This ratio, determined by dividing the widest part of the fundus parallel to the neck of the aneurysm by the neck width itself, if greater than or equal to 2 is oft quoted in the literature as sufficient in lumen size to prevent the loss of coil from the mouth of the aneurysm. This ratio appears to hold true for saccular aneurysms but is inadequate for aneurysms that are tubular or irregular in appearance. In these situations measuring the volume of the aneurysm in relation to the surface area of the aneurysm mouth may provide more information towards decision making. *Methods:* We retrospectively reviewed angiograms for the past 3 years to determine aneurysm volume and area of the aneurysm mouth. Aneurysm morphology was classified into saccular-unilobed, -bilobed, or -multilobed, fusiform, tubular-unilobed, or -multilobed. Aneurysm volume was estimated as $V = 4\pi abc/3$ where a, b and c is one-half the length, width and height of the aneurysm taken from AP and lateral angiograms. The area of the aneurysmal orifice was calculated as $S = \pi ab$ where a and b are the measured half-length and half-width of the aneurysm neck. Residual aneurysm was deemed significant if less than 99% of the aneurysm was obliterated through either clipping or coiling. *Results:* Comparison of aspect ratio and V/S in predicting aneurysm obliteration through coiling illustrates a trend towards better prediction for the latter in smaller and more irregularly shaped, ie tubular aneurysms. Obliteration through clipping appears to be independent of anatomical constraints. *Conclusions:* V/S ratios may add an important measure in helping to determine which aneurysms will benefit from coiling.

P-010

Hæmodynamic changes after superficial temporal artery to middle cerebral artery (M4) bypass

D Sinclair (Montreal)*

Background: Cerebral angiography is important in helping to understand the hæmodynamic responses occurring in the cerebral circulation prior to permanent test balloon occlusion.The angiographic phenomenon of a delayed venous phase during temporary occlusion is a relative contraindication to balloon detachment. Equalization of the angiogram venous phase after extracranial-to-intracranial (EC-IC) bypass is a positive sign that cerebral blood flow and the cerebral oxygen extraction fraction is improved. This information along with the concurrent clinical response to temporary ICA occlusion helps to better determine the risk to the patient of future ischæmic injury. *Methods:* A case of successful balloon occlusion post EC-IC revascularization is discussed with evidence of early hæmodynamic cerebral blood flow changes. *Results:* These changes were suggestive of a 'steal' or 'sump' phenomenon that may have been driven by the retrograde filling of the large paraophthalmic artery aneurysm for which the bypass grafting was performed. *Conclusion:* Angiographic and clinical criteria prior to, and after, EC-IC bypass and permanent balloon occlusion of the ICA are described along with a discussion on the criteria for cerebral revascularization.

P-011

Reversal of thromboembolic stroke after carotid endarterectomy using IV abciximab: Case Report

M Setiawan (Calgary), A Demchuk (Calgary), M Hill (Calgary), J Wong (Calgary)*

Background: Thrombolysis is almost always contraindicated in patients undergoing recent surgery. We report a unique case of successful treatment with intravenous abciximab for thromboembolic stroke following carotid endarterectomy. *Methods and Results:* A 58 year-old man was admitted with a left hemispheric minor stroke secondary to severe carotid stenosis. He underwent a technically unremarkable microsurgical carotid endarterectomy and awoke neurologically intact. Six hours later, the patient developed acute right hemiplegia and aphasia (NIHSS 13). CTA demonstrated a new partially occlusive intravascular thrombus at the surgical site and possible distal MCA emboli. Predicting a pathophysiology of platelet-rich thrombus, therapeutic intravenous thrombolysis was planned and the patient was intubated to mitigate concerns of potential neck hematoma and airway obstruction. Bolus administration of IV abciximab (0.25 mg/kg) with subsequent infusion resulted in immediate disappearance of microembolic signals on transcranial Doppler ultrasonography. The following day, the patient's hemiparesis was nearly resolved and follow-up evaluation at one month demonstrated no defecits (NIHSS 0). *Conclusion:* To our knowledge, this is the first reported use of intravenous abciximab for emergently reversing stroke after carotid endarterectomy. Judicious patient selection and close ICU support including prophylactic intubation is essential when considering stroke thrombolysis in this setting.

P-012

Use of Neuronavigation in the Clipping of a Distal MCA Aneurysm

R Avery (St. John's), F Maroun (St. John's), G Murray (St. John's), A Engelbrecht (St. John's)*

Background: Without the use of intra-operative angiography, the clipping of distal aneurysms involving the posterior temporal, temporal occipital and angular branches can be difficult. Neuronavigation gives accurate localization of the aneurysm and aids in surgical treatment. *Methods:* A 54 year old gentleman presented with symptoms of a left MCA infarct after a two week history of severe headaches. Physical examination demonstrated significant expressive aphasia in association with a dense right hemiparesis. A CT scan revealed resolving subarachnoid hemorrhage, as well as hypodensity in the left MCA territory. Cerebral angiography confirmed the presence of vasospasm, as well as a fusiform aneurysm involving the M2 anterior parietal artery within the Sylvian fissure. *Results:* A 3D CT scan was performed and reconstructed in the Neuronavigation system. A conventional pterional craniotomy was then performed; however, under navigation guidance only a small area of the Sylvian needed to be dissected to successfully clip the aneurysm. The patient's recovery was uneventful, with gradual improvement in his aphasia and recovery of leg and upper arm function. *Conclusions:* Neuronavigation is a useful tool in the clipping of distal aneurysms, allowing for precise localization and thus minimizing surgical morbidity.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-013

Insular Aneurysm Presenting with Bilateral Paresthesias and Cardiac Manifestation

R Malak (Montreal), M Bojanowski (Montreal)*

Background: The insular cortex has been implicated as a higher autonomic control and secondary sensory center. Previous studies have shown that insular pathologies and electrical stimulations can induce autonomic symptoms, such as nausea, laryngeal constriction and cardiac manifestations. They can also produce contralateral, ipsilateral, and even bilateral paresthesias. Method: Case report and review of the literature. *Results:* A 50-year-old female previously in good health presented with left arm paresthesias, dry mouth and palpitations that lasted 3 days. Symptoms were initially believed to be of cardiac origin but investigation was normal. Three weeks later symptoms recurred with paresthesias involving left arm and leg. Intensification of these symptoms was accompanied with peri-oral paresthesias and throat constriction. In the following weeks, paresthesias became bilateral. A cerebral MRI and angiography revealed an unruptured 11mm right sylvian aneurysm in the insular region. A surgical approach was proposed. After aneurysm clipping, all symptoms resolved. *Conclusion:* Lesions compressing the insular region can manifest as long lasting somatosensory and autonomic symptoms. To our knowledge this is the first report of a sylvian aneurysm presenting with bilateral paresthesias and palpitation due to compression of the insula. Aneurysm clipping and subsequent decrease of mass effect resulted in symptom resolution.

P-014

Failure of repeated endovascular treatment of the basilar artery aneurysm-a case report

K Meguro (Saskatoon)*

The long term efficacy of endovascular therapy for ruptured cerebral aneurysm has not been established. A case of the basilar artery aneurysm which was treated with multiple endovascular procedures was presented.*Clinical presentation:* A 44 years old man presented with sudden onset of severe headache and confusion. A CT scan showed subarachnoid hemorrhage. 12 years prior to the admission he underwent clipping of the ruptured internal carotid aneurysm. Cerebral angiography showed de-novo basilar aneurysm which was responsible for the hemorrhage. *Intervention:* Initially the basilar artery aneurysm was treated with a balloon embolization. Because of the refilling of the aneurysm and an episode of minor leak, GDC coil embolization was performed 7 months after the initial therapy. Due to coil compaction the second GDC coiling was done 6 years after the initial treatment. Nine years after the initial therapy, the patient presented with mental decline and incontinence of urine. Cerebral angiography showed coil compaction and enlargement of the aneurysm causing compression of the deep structure. The patient died from a massive hemorrhage nine years and three months following the initial treatment. *Conclusion:* Refilling of an aneurysm and hemorrhage could occur many years after endovascular treatment. Long term followup is essential particularly in younger patients.

P-015

Correlation between individual vessel arterial blood flow measured with MRI-NOVA computer program and blood velocities measured by transcranial Doppler ultrasonography in evaluating cerebral vasospasm after subarachnoid hemorrhage

N Heran (New York), M Chwajol (New York), D Lefton (New York), D Langer (New York)*

Background: Transcranial Doppler (TCD) has been used to detect elevated blood velocities suggesting cerebral vasospasm in subarachnoid hemorrhage (SAH) patients. The usefulness of TCD recording in clinical decision-making has been questioned due to its inability to directly measure blood flow or vessel diameter and technical difficulties. MRI-based non-invasive optimal vessel analysis (MRI-NOVA) allows for rapid, non-invasive measurements of CBF. We investigated whether there is a correlation between MRI-NOVA measurements of CBF and TCD recordings, hence allowing its utility in SAH. *Methods:* Patients with grade I - III SAH who underwent aneurysm treatment were examined. MRI-NOVA was obtained on patients without clinical evidence of neurological deficit with TCD elevation >150 and compared with TCD values. *Results:* We were able to illustrate the relationship between the quantitative CBF measurements using MRI-NOVA and flow velocity measurements using TCD. Lower TCD velocities corresponded to higher CBF on NOVA. Higher TCD velocities corresponded to lower CBF on NOVA. Normal TCD velocities correlated with normal MRI-NOVA CBF. *Conclusions:* MRI-NOVA may be equally valuable as TCD in evaluating vasospasm and might be used in problematic cases where TCD results are equivocal or unable to be obtained, or as an adjunct in both diagnosis and serial follow-up in patients with suspected vasospasm.

P-016

Use of balloon remodeling technique within Neuroform stents in the endosaccular coiling of wide-necked intracranial aneurysms

N Heran (New York), K Namba (New York), Y Niimi (New York), J Song (New York), A Berenstein (New York)*

Background: The balloon remodeling technique has broadened the treatment of wide-necked intracranial aneurysms. Experience with the Neuroform stent is increasing and its safety in managing these aneurysms is documented. We describe our experience with a technique where we use the balloon remodeling technique in conjunction within Neuroform stents to obtain more reliable and greater degree of aneurysm occlusion when treating wide-necked intracranial aneurysms. *Methods:* We have treated a total of 41 patients with wide-necked aneurysms with the Neuroform stent. Seven of these patients had procedures in which balloon remodeling technique was used in addition to the stents. Inability to adequately coil the aneurysm despite the stent was the primary indication for using this technique. *Results:* Six of seven patients had successful coiling of their aneurysms in which, without balloon assistance, the aneurysm would not have been readily or as safely treated. Occlusion of 80-95% was obtained in these patients. There were no neurological complications from the treatments. *Conclusion:* Balloon remodeling technique with Neuroform stents in the treatment of wide-necked intracranial aneurysms is technically feasible and may allow tighter

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

coil packing which may decrease the risk of coil compaction and aneurysm recanalization when compared to stenting or balloon remodeling technique alone.

P-017

Diagnosis and treatment of brain aneurysms based on CT angiogram findings. Three years of experience at the Health Science Centre Winnipeg

M Campos-Benitez (Winnipeg), M West (Winnipeg)*

Multi detector row CT (MDCT) technology 4 and 16 slice has been available for the last 6 years. It has changed significantly the resolution of images obtained from previous CT scanner since they allow rapid, (over 4 times faster than previous spiral CT machines), gathering images of higher resolution. In 2002 the HSC Winnipeg acquired a 16 Slide MDCT scanner capable of producing Ct angiograms of high quality (0.625mm per cut) fast acquisition (5.6 mm/0.8 seconds) allowing diagnosis and treatment of intracranial aneurysms and displacing rapidly the use of angiogram as diagnostic tool. We present the experience from 2002 to 2005 of 217 patients diagnosed and treated (surgical, endovascular or observation) for intracranial aneurysms, ruptured and unruptured. The findings were compared with the literature available. In conclusion, based in our experience, CTA obtained from MDCT was rapidly performed, is convenient, reliable and safe as the sole tool for the diagnosis and treatment of intracranial aneurysms.

P-018

The mRNA Induction of Myxovirus Resistance Protein A (MxA) in one Interferon Beta-treated (IFNb) Multiple Sclerosis (MS) Patient presenting with Neutralizing Antibodies

E Gibbs (Vancouver), E Gong (Mechelen), P Smyth (Vancouver), S Grossberg (Milwaukee), J Oger (Vancouver)*

Background: MxA is a specific gene induced by IFNβ and MxA mRNA induction is a bio-response marker in IFNβ-treated patients. We have previously shown that neutralizing antibodies (NAbs) to IFNβ inhibit MxA induction and that disappearance of NAbs correlates with restoration of MxA induction. The present study reports the comparative effect of 3 IFNβs in the presence of NAbs. *Methods:* One of our patients after 7 years of treatment with IFNβ had developed NAbs (3305 TRU/mL) and had lost MxA induction in response to IFNβ. Following 7 months of wash-out, her NAbs went down to 496 TRU/ml. At that point we challenged her with the 3 available IFNβs (Betaseron(r) , Rebif(r), Avonex(r)) and measured MxA mRNA using real time RT-PCR. *Results:* At 12 hours post-injection, ΔΔ Ct was 13.80 following the Betaseron(r) injection, 4.60 following the Avonex(r) and 2.80 following the Rebif(r). This contrasts respectively with 2.85, 2.00 and 1.65 when the NAbs were high. In contrast, treated MS without antibodies showed MxA induction ranging from 25 to 100. *Conclusions:* We confirm that MxA mRNA expression is abrogated by NAbs. Stopping IFNβ therapy reduces NAb titres and at lower NAbs levels, IFNβ1-b induces a higher response that IFNβ-1a.

P-019

Use of Quantitative MRA (NOVA) for guiding extracranial to intracranial bypass surgery in the management of complex intracranial aneurysms

N Heran (New York), D Langer (New York), L Ostergren (Chicago), D Lefton (New York), J Song (New York), Y Niimi (New York), A Berenstein (New York), C Sen (New York)*

Background: EC-IC bypass, either alone or prior to endovascular procedures, is a valuable treatment strategy for managing complex intracranial aneurysms (IA's). The ability to quantify individual vessel cerebral blood flow (CBF) prior to surgery can reveal flow requirements-aiding in selection of optimal bypass conduits, anticipate the hemodynamic consequences of vessel sacrifice and assess whether the goals of flow augmentation or replacement have been achieved. Quantitative MRA (NOVA) for perioperative evaluation of patients prior to and following EC-IC bypass in the management of IA's to establish its clinical efficacy is described. *Methods:* Four patients undergoing EC-IC bypass to treat complex IA's were studied with preoperative and postoperative NOVA, using the information to guide treatment. Rationale for treatment decisions and outcome are detailed in each patient. *Results:* NOVA allowed preoperative quantitative individual vessel CBF assessment in order to match flow demand and requirement, allowing appropriate bypass selection. With the ability to non-invasively monitor intracranial vessel flow and graft adaptation postoperatively, we were able to validate preoperative decision making and to optimally time subsequent interventions to minimize stroke risk. *Conclusion:* The addition of quantitative vessel flow data to the management of complex intracranial aneurysms has guided our patient management, allowing us to better understand our results and tailor therapy appropriately.

P-020

Large ophthalmic segment aneurysms with anterior optic pathway compression: assessment of anatomic and vision outcomes after endosaccular coiling

N Heran (New York), J Song (New York), M Kupersmith (New York), Y Niimi (New York), K Namba (New York), D Langer (New York), A Berenstein (New York)*

Background: The optimal treatment for ophthalmic segment aneurysms (OSA's) with anterior optic pathway compression (AOPC) is without consensus. Although surgical results have been described, endosaccular coiling outcomes in these aneurysms are not well reported. *Methods:* A retrospective review of all patients with unruptured aneurysms with AOPC treated by endovascular methods. We evaluated baseline and outcome visual function of affected eyes, using visual acuity (VA) and visual fields (VF), aneurysm features, extent of aneurysm and carotid artery occlusion, additional interventions, and complications. *Results:* Sixteen patients with mean follow-up of 3.34 years had 27 eyes affected, with pretreatment worse eye mean VA and VF grade of 1.06, sd 1.1 and 3.3, sd 1.2, respectively. All aneurysms were larger than 10 mm with necks > 4 mm. 15/16 aneurysms had primary endosaccular coiling with parent vessel preservation; 1 aneurysm was trapped with carotid artery occlusion (CO). One patient died from aneurysm rupture 1 month

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

after coiling with no follow-up vision data. Vision worsened in 5 (33.3%), remained unchanged in 4 (26.7%), and improved in 6 (40%). Eleven patients had 12 additional procedures including endovascular CO with or without EC-IC bypass (6-1 after recoiling), recoiling (5), and CNII decompression (1). CO as the second treatment of patients resulted in vision improvement in 80%. Overall, vision improved in 7 (46.7%), remained stable in 4 (26.7%), and worsened in 4 (26.7%). The final mean VA (1.04, sd 1.1) and VF (3.2, sd 1.4) in the worse eye was similar to baseline. Aneurysms were completely closed in 7 patients (46.7%), 6 of whom had CO, while 8 aneurysms remained incompletely closed. *Conclusions:* Endosaccular treatment, with carotid artery preservation, of OSA's with AOPC may not benefit vision and additional procedures may be needed. For such aneurysms, endovascular trapping with CO appears to result in better vision, clinical and anatomic outcomes than endosaccular coiling alone.

DEMENTIA

P-021

Mini-Mental State Examination Scores Differ When Administered Via Telehealth (Videoconferencing) Compared With Administration In Person To Patients With Early Dementia

A Kirk (Saskatoon), M Crossley (Saskatoon), D Morgan (Saskatoon), C D'Arcy (Saskatoon), J Biem (Saskatoon), D Forbes (Saskatoon), N Stewart (Saskatoon)*

Background: Improving videoconferencing technology is increasing utility of telehealth in assessing patients with neurological disease. For techniques to be used effectively, we must know whether clinical information obtained via telehealth is comparable to that from in-person assessment. We recently began serving patients with early dementia in distant parts of Saskatchewan through a Rural and Remote Memory Clinic. This provides an opportunity to compare mental status assessments performed by telehealth and in-person. *Method:* Patients initially travelled to Saskatoon for a one-day in-person assessment by a neurologist, neuropsychologist, and physiotherapist as well as CT imaging and bloodwork. Patients were then seen in follow-up at six weeks, twelve weeks, six months, twelve months, and annually thereafter. Half the patients were randomized to initial follow-up assessment in person in Saskatoon and half to telehealth assessment from their home community. Subsequent follow-up visits alternated between in-person and telehealth. During every follow-up visit, the same neurologist administered the Mini-Mental State Examination (MMSE) and scores obtained at all in-person visits were compared by t-test to those obtained at all telehealth visits. Random assignment and alternation between visit type minimized bias related to improvement due to treatment or decline over time. *Results:* Thirty-nine patients underwent seventy-seven assessments. Mean MMSE score was significantly higher at in-person visits (M =21.8 (SD = 7.5)) than at telehealth visits (M = 18.0 (SD = 7.4)) ($p<0.05$). *Conclusions:* Patient unfamiliarity with telehealth may explain some of this difference. Clinicians assessing patients through videoconferencing must be aware that mental status scores may be significantly lower than at in-person assessments.

P-022

Conjugal amyotrophic lateral sclerosis: report of two unrelated Ottawa couples

J Marriott (Ottawa), P Bourque (Ottawa)*

Background: Amyotrophic lateral sclerosis (ALS) is usually sporadic, although ten percent of cases are familial. Geographical clustering and very rare conjugal associations have also been reported. Previously reported cases on conjugal ALS have failed to identify a toxic or infectious exposure. Conjugal ALS has not been previously described in Canada. Methods: Each partner in two marriages was sequentially evaluated in the neurology clinic. Appropriate bloodwork, electrodiagnostic studies and neuroimaging was performed in each of the four patients. *Results:* All four patients were diagnosed with motor neuron disease. In the first couple symptoms began in the husband in 1998 and the wife in 2001. In the second couple, symptoms began in the wife in 1999 and the husband in 2004. His sister had died of ALS several years previously. *Conclusions:* These are the first reported cases of conjugal ALS in Canada. We also report the second worldwide case of ALS occurring in a first-degree relative of an affected couple. The latter situation likely represents a sporadic / genetic couple. Similar to other examples of epidemiological clustering in ALS patients, conjugal ALS might raise the possibility of an environmental trigger factor although an unfortunate coincidence remains the most likely explanation.

P-023

Demonstration of the Alzheimer's disease gamma-secretase enzyme complex in the mouse brain endosomal/ lysosomal system using Free Flow Electrophoresis

S Pasternak (London)*

Background: A hallmark of Alzheimer's disease is the deposition of beta-amyloid in the brain. Beta-amyloid is produced by the proteolytic cleavage of the amyloid precursor protein (APP), first by a beta-secretase and then by a gamma-secretase (a complex containing presenlin, nicastrin, mAph1, and Pen2). Although many lines of evidence suggest that beta-amyloid is produced in the endosomal/ lysosomal system, there is currently no consensus as to where beta amyloid is generated. One of the reasons for this confusion is that endosomes and lysosomes overlap with other organelles in size and density, making them difficult to purify. *Methods:* We have set up a novel technology called Free Flow Electrophoresis (FFE). In FFE, samples are injected into a thin layer of moving carrier fluid and are electrophoretically separated in the liquid phase. This technology is present in only a handful of laboratories in the world. *Results:* Using FFE, we are able to purify lysosomes from the mouse brain where they are separated from early biosynthetic compartments. These lysosomes contain APP colocalized with and the gamma secretase proteins nicastrin, presenlin-1, mAph1 and Pen2 and gamma secretase activity. *Conclusions:* This work reinforces the importance of the endosomal/ lysosomal system in Alzheimer's disease.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-024

Potential importance of MRI changes in diagnosing sporadic Creutzfeldt Jakob disease: A report of two cases

J Pettersen (Calgary), E O'Ferrall (Calgary), M Al-Mekhlafi (Calgary), N Pillay (Calgary), D Zochodne (Calgary), K Hoyte (Calgary), W Morrish (Calgary), N Switzer (Calgary), R Bell (Calgary)*

Background: Sporadic CJD is a fatal prion disease characterized by rapidly progressive dementia, myoclonus, EEG periodic sharp wave complexes (PSWCs), and CSF 14-3-3 positivity. While not part of the diagnostic criteria, characteristic MRI changes (striatal hyperintensities and"cortical ribboning" on FLAIR and DWI) have recently been shown to be more specific and sensitive than other criteria, particularly in the earlier stages of disease. *Methods:* Case Reports. *Results:* Case 1: A 56-year-old female presented with two months of sensory, visual, and psychiatric symptoms followed by rapid global cognitive decline and gait apraxia. EEG revealed diffuse slowing while MRI demonstrated FLAIR and DWI striatal hyperintensities consistent with CJD. Startle myoclonus and akinetic mutism developed later. A CSF 14-3-3 was positive. Autopsy was declined. Case 2: A 73-year-old female presented with two months of visual and cognitive symptoms followed by rapidly progressive dementia. EEG performed at one and two months post-onset revealed diffuse slowing. DWI and FLAIR sequences on MRI demonstrated the characteristic striatal hyperintensities and cortical ribboning. Startle myoclonus and akinetic mutism later developed. *Conclusions:* Our patients had striking clinical features of sporadic CJD but neither had PSWCs. In both instances, however, MRI changes were valuable in the early diagnosis of CJD.

P-025

Brain Correlates Of Depressive Symptoms In Alzheimer's Disease

N Levy (Toronto), A Burhan (Ottawa), S Black (Toronto)*

Depressive symptoms of varying severity are prevalent in up to 63% of Alzheimer's disease (AD) patients, and when present, can result in greater cognitive decline and increased caregiver burden. The etiology is not well understood, but a neurobiological rather then reactive phenomenon seems likely. The present study aimed to localize the neural areas involved in depressive symptoms in a sample of AD patients using 99mTc-ECD single photon emission computed tomography. Fifty-six patients (25 men; mean±SD age, 76.8±6.2) matched on age, level of education, and Mini Mental State Examination score were assessed using the Cornell Scale for Depression in Dementia (CSDD). Significant depressive symptoms, based on a score of 8 plus on the CSDD, were present in 28 patients (46%). Statistical parametric mapping analyses revealed significantly lower perfusion in the right dorsolateral and superior prefrontal (P=0.002) cortex of depressed patients. Similar patterns were seen in the left dorsolateral and superior prefrontal cortex, but these difference were not as strong (P=0.02). In this study, depressive symptoms were associated with hypoperfusion in the prefrontal cortex. These findings are consistent with previous reports in primary depression that suggest that these regions are involved in affect and emotional regulation.

P-026

Steroid-Responsive Alzheimer Disease

F Mateen (Rochester), D Drubach (Rochester), B Boeve (Rochester), J Parisi (Rochester)*

Background: A 54-year-old woman, a previously high-functioning executive, presented with 4 years of depressed mood and cognitive impairment. She became acutely disorganized, depressed, and agitated and required psychiatric admission and restraint. Although diagnosed with "mild lupus" approximately 15 years earlier, she had been asymptomatic. Initial examination was notable for a MMSE score of 6. Laboratory testing showed mild elevations in ANA and ESR and mild anemia. MRI showed moderate generalized cerebral and cerebellar atrophy, inappropriate for age. EEG, cerebral angiogram, and CSF analysis were within normal limits. She received a 5-day course of intravenous methylprednisolone, followed by an oral prednisone taper. Her MMSE improved to 20 and she became alert, attentive, and oriented to person, and she was no longer restless or depressed. She died unexpectedly 8-months later. Autopsy revealed Alzheimer disease, but no evidence of inflammation or vasculitis. *Discussion:* Alzheimer disease presenting in the young with steroid responsiveness has not been described previously, and the pathogenesis remains poorly understood. Steroid treatment may be worth considering in any young patient with an atypical encephalopathy when other identifiable and treatable causes have been excluded.

P-027

Executive function, neuropsychiatric symptoms and regional cerebral perfusion correlates of functional component processes in activities of daily living: Alzheimer's Disease vs Frontotemporal Dementia

N Nadkarni (Toronto), L Naama (Toronto), S Black (Toronto)*

Background: This study examines the executive function (EF), behavioral and regional cerebral perfusion (rCBF) correlates of the functional components involved in the activities of daily-living in Alzheimer's Disease (AD) and FTD. *Methods:* Functional components of self-care and Instrumental Activities of Daily-Living (IADL) were assessed using the Disability Assessment in Dementia (DAD). EF was evaluated using the Dementia Rating Scale (DRS), Wisconsin Card Sorting Test (WCST), backward digit span (BDS), phonemic fluency and Trails Making Test-B. Behavioral symptoms were scored on the Cornell scale and Neuropsychiatric Inventory (NPI). rCBF was measured using Single-photon-emission computerized tomography. *Results:* The two groups (28 AD and 24 FTD) were comparable in their baseline characteristics. The FTD group had lower DAD scores than the AD group (31.1 ± 9 vs 35.6 ± 5.3; $p<0.05$). In the AD group, IADL-initiation correlated with the BDS ($r=0.48$, $p<0.01$), WCST categories ($r=0.52$, $p<0.01$), Cornell scale ($r=-0.5$, $p<0.05$) and hypoperfusion in bilateral frontal-poles ($r=0.5$ (Lt), 0.8 (Rt); $p<.01$) and right dorsolateral-prefrontal-region ($r=0.5$; $p<.01$). In the FTD group, IADL-initiation correlated with NPI ($r=-0.63$, $p<0.01$) and IADL-planning with the DRS-conceptualization sub-score ($r=0.67$, $p<0.01$). *Conclusion:* Impairment in IADL-initiation correlates with executive dysfunction, depressive symptoms and frontal hypoperfusion in AD and with behavioral disturbances in FTD. Executive dysfunction in FTD is associated with IADL-planning disturbances.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

EDUCATION, EVALUATION, HISTORY

P-028

W.D. Stevenson's legacy to Neurosurgery at Dalhousie University

K Mukhida (Halifax), I Mendez (Halifax)*

The origins of neurosurgical services in Atlantic Canada are tied to the individual efforts of W.D. Stevenson. Born in Hamilton, Ontario, Stevenson completed his senior matriculation in Dunnville before studying medicine at the University of Toronto. He completed the Gallie surgical course in Toronto and then spent one year training with Edward Archibald at McGill University. After working for two years with the Canadian Mobile Neurosurgical Unit in Europe during the Second World War, Stevenson undertook formal neurosurgical training with K.G. McKenzie. He was thereafter recruited to Halifax to start the neurosurgical service at the Victoria General Hospital in January 1948 and he remained head of the division for the next 26 years. His pioneering work laid the foundations for the establishment of a major academic neurosurgical service at Dalhousie University. After his retirement, Stevenson moved back to Ontario and began his second career, transferring his passion for Neurosurgery to oil painting. His legacy to Neurosurgery in Atlantic Canada will be remembered in perpetuity with the annual Neurosurgery resident research award at Dalhousie University established and named in his honour. This paper focuses on Stevenson's life and work in Neurosurgery and celebrates his contributions to Atlantic Canada.

P-029

An evaluation of a formal Evidence-Based Clinical Practice (EBCP) Curriculum in a Neurology Residency Program: influence in graduates' practice

J Burneo (London), M Jenkins (London), M Bussiere (London)*

Background: The University of Western Ontario Evidence-Based Neurology Group was implemented in 1998 as part of the Neurology Residency Programme's Curricula. At each biweekly session, relevant neurological topics, chosen by the residents, are explored, following the EBCP principles of creating a specific question, finding the best evidence, and critically appraising it. *Methods:* Using an anonymous survey we evaluated how likely our graduates' clinical practice has been influenced by the EBCP knowledge; and, if they are teaching these concepts to residents or medical students. The questionnaire/survey was sent to all neurologists who graduated after the implementation of the programme. *Results:* Ten (77%) out of 13 neurologists returned the survey. All respondents attended the sessions consistently. Although all believe the EBCP-concepts are useful, they only use them when time allows. On a 1-to-10 scale, they rated the influence to include EBCP-concepts in their daily clinical practice as high (mean=8.5, SD=1.2). Most of them have frequent contact with trainees, but do not teach EBCP-concepts to them on a consistent basis because of time constraints. Finally, all expressed the need to continue having this formal curriculum during residency. *Conclusion:* Although EBCP curriculum increases neurologists' confidence in knowledge of existing evidence, and reinforces the EBCP principles, these concepts are neither used in daily clinical practice nor being taught to trainees, due to time constraints.

P-030

Quality improvement in neurosurgery

B Lo (Hamilton), G Guyatt (Hamilton), C Goldsmith (Hamilton)*

Background: The field of quality improvement began with Deming in the 1940s with the automotive industry. Today, Deming's principles are adapted to the healthcare setting to maximize patient care quality. Such principles have yet to be used in a University Neurosurgical Service. *Methods:* Sampling quality improvement literature, adapting QI principles to Neurosurgery. Introduction of such principles to the Neurosurgical Service at McMaster University, Ontario, Canada. *Results:* Deming's Chain Reaction can be adapted to Neurosurgery: improve quality of patient care, decrease costs associated with treatment of complications, increase productivity with improved length of stay, increase catchment and referral areas of patients, provide more jobs with job satisfaction, and increase return on health care investment by public. To improve patient care quality, one has to try best to meet their expectations. Example of such is analyzing waiting times for neurosurgical clinic at McMaster University, with documentation on Pareto chart and Fishbone Cause-and-Effect diagram. *Conclusions:* Neurosurgery can benefit from Deming's Principles of Quality Improvement, with the end result of improved quality of patient care, meeting patients' expectations and increasing number of jobs with job satisfaction.

P-031

The MNI and the EMI scanners (1973-1976): historical note

A Sabbagh (Montreal), W Feindel (Montreal), D Melanson (Montreal)*

Background: The Montreal Neurological Institute (MNI) installed Canada's first EMI (CT) scanners for brain (1973) and spine (1976). The highlights of the application of this computerized imaging system and the critical inputs of Godfrey Hounsfield, the inventor, and of James Ambrose, the radiologist who delineated its clinical role, are analyzed from an historical perspective. *Method:* MNI records were reviewed to document how the acquisition of these pioneer computerized scanners affected neurological and neurosurgical procedures and practice. *Results:* The advent of CT resulted in striking advances that included:

1) Non-invasive display of the ventricles and cerebro-spinal pathways led to elimination of ventriculography and pneumoencephalography.
2) The differential diagnosis between hematomas and infarcts enabled more exact management of patients with strokes.
3) The 3-dimensional display and differential diagnosis of brain tumors, abscesses, and a range of miscellaneous lesions greatly improved neurosurgical treatment.
4) CT of patients with epilepsy revealed focal lesions not before demonstrable.
5) Dramatic shift of inpatient to outpatient neurological practice.

Conclusions: The advent in 1973-1976 of computerized brain and spinal scanning at the MNI resulted in revolutionary changes in neurological and neurosurgical diagnosis and practice. The close collaboration of the inventor and of the radiologist who first evaluated the EMI scanner proved essential.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-032

The Quality of Neurological Resources on the Internet - A Patient's Perspective

B Jhawar (Windsor), N Liem* (Windsor), R Chawla (Windsor), V Kokavec (Windsor), P Oldfield (Windsor)*

Introduction: The internet has become an important source of health information. However, quality of information varies as there are few regulations on information content. We analyzed websites for four common neurological disorders (lumbar disc, carpal tunnel syndrome, meningioma, and head injury) to determine quality. *Methods*: We used three common search engines (Yahoo, Google and MSN) to identify the websites patients would commonly encounter. For each neurological condition we identified the first ten unique websites accessed. We analyzed each site for credibility, content, disclosure, design, interactivity and conflict of interest according to criteria developed by the Health Information Technology Institute. *Results*: We reviewed 120 websites and identified 76 unique sites. Physicians/experts authored 50.0% of sites and sponsors were academic (20.0%), non-profit (22.5%), and private institutions (45.0%). Peer review was acknowledged as part of the article preparation process in 35.0% of sites. Few sites (37.5%) were updated within the last year. 17.5% of sites quoted references, but 27.5% had major omissions of fundamental information. Advertising was present in 37.5%. Conflict of interest was noted (37.5%) as defined by solicitation of patients or physicians. Many websites had a disclaimer (52.5%). *Conclusion*: The quality of information on the internet varies. Patients need the guidance of healthcare professionals to help interpret this information.

EPILEPSY, EEG

P-033

Ictal SPECT in the presurgical evaluation of patients with Rasmussen's Encephalitis

J Burneo (London), G Young (London), W Vezina (London)*

Background: Rasmussen's encephalitis is a progressive disease characterized by severe progressive neurological and cognitive deficits. It is a difficult condition to treat with conventional medical treatment, and requires surgical intervention in most of the cases. *Methods:* We present two cases of Rasmussen's encephalitis who did not respond to conventional antiepileptic treatment, and were evaluated for possible surgical intervention. In both cases ictal and interictal SPECT scans were performed. Ictal scans followed an injection of 99mTc-hexamethyl-propyleneamineoxime (HMPAO) during one of the seizures (confirmed by simultaneous EEG recordings); a baseline interictal scan was undertaken 24 hours later. *Results:* In the first patient, with severe developmental delay, hyperperfusion over the right hemisphere was seen with ictal SPECT, which finally guided a right functional hemispherectomy and subsequent seizure control. In the second patient, without any neurological deficit, ictal hyperperfusion was seen over the neocortical right frontal and temporal area exclusively, confirmed with intracranial EEG evaluation, which allowed a neocortical resection of the areas involved, with subsequent seizure control. Pathological evaluation of specimens resected confirmed the diagnosis of Rasmussen's encephalitis. *Conclusion:* In the armamentarium of tools used for the localization of the epileptogenic focus in patients with Rasmussen's encephalitis, ictal SPECT appears to be an important one.

P-034

Prognostic power of Video-EEG in preterm infants with seizures and their outcome

G Marchiò (Parma), F Pisani (Parma)*

Background: The aim of the study is to evaluate the predictive power of the video-electroencephalography and the neurodevelopmental outcome of preterm infants with seizures. *Methods:* We analyzed all preterm infants consecutively admitted to the NICU of the University Hospital of Parma, in the period January1999-June2003. Thirty-five newborns were selected according to the following criteria: gestational age below 37 week, repeated neonatal EEG-confirmed seizures, need of chronic anticonvulsant therapy, at least one Video-EEG registration, neurological follow-up up to 24 months of corrected gestational age. *Results:* The abnormal Video-EEG recording is significantly associated with the poor neurodevelopmental outcome ($p<0.006$). At the last follow-up: 1 patient was lost (3%), the outcome was normal in 5 infants (14%), 5 patients presented Cerebral Palsy (14%), in others 4 cases the Cerebral Palsy were associated with mild or moderate Mental Retardation (11%), others 7 infants showed the Cerebral Palsy accompanied from Severe Mental Retardation and Epilepsy (20%) and 13 of preterm infants (13/35) died (38%). *Conclusions:* Neonatal seizures in preterm infants are significantly associated with Cerebral Palsy, Mental Retardation and Epilepsy. An abnormal Video-EEG activity is a predictive factor of these severe sequelae.

P-035

Occipital status epilepticus and visual loss: Clinical manifestations of Posterior Reversible Encephalopathy Syndrome

S Yip (Vancouver), M Sargent (Vancouver), L Wong (Vancouver), M Connolly (Vancouver)*

Background: Occipital lobe seizures have been implicated as a clinical manifestation of posterior reversible encephalopathy syndrome (PRES); however, epileptiform discharges or seizures are rarely documented. *Methods:* We describe a patient with PRES presenting with visual loss due to partial status epilepticus of occipital lobe origin. *Results:* A 15 year old right handed male with Wegener's granulomatosis presented with an acute onset of severe headache associated with nausea, vomiting and blurred vision. These symptoms were followed by episodes of complex partial seizures with secondary generalization. Examination revealed bilateral complete visual loss and parietal dysfunction. EEG showed electrographic seizures originating independently in the bioccipital areas. Magnetic resonance imaging of the head showed bilateral parietal-occipital, temporal and frontal white matter T2 hyperintense signal abnormalities which were consistent with PRES. Following treatment phenytoin and ativan, he had no further seizures and his visual acuity improved to 20/20 bilaterally. *Conclusion:* In this case

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

report, we have documented electrical seizures originating from bioccipital area and recovery of vision following successful treatment of the electrical seizures. This supports the hypothesis that occipital lobe seizures may be a manifestation of PRES. Furthermore, this case illustrates the importance of performing an EEG urgently to identify possible non-convulsive status in patients presenting with PRES.

P-036

Mortality in preterm newborns with neonatal seizures

G Marchiò (Parma), F Pisani (Parma)*

Background: A comparison between preterm infants with or without seizures. *Methods:* We analyzed preterm infants consecutively admitted to NICU of the Parma's University Hospital, in the period January1999-June2003. We selected 35 newborns according to the following criteria: gestational age between below 37 weeks, repeated neonatal video-EEG confirmed seizures, need of chronic anticonvulsant-therapy, neurological follow-up up to 24 months of corrected gestational age. *Results:* In a comparison between 21 preterm infants of our study-group (with seizures and with gestational age below 34 weeks), and a control-group of 217 preterm infants with the same gestational age and without seizures, we can observe the mortality of our study-group is of 39%, while the control-group reports a mortality of 14.7% (p=0.002). In our study-group of 35 newborns with seizures, 21 have birth weight below 1500g, and a mortality of 42.8%. Their mortality is very high, in a comparison with a control group of 187 preterm infants with the same birth weight, without seizures, whose mortality is 14.9% (p=0.006). *Conclusions:* In preterm infants with neonatal seizures the percentages of mortality are significantly higher than the ones of newborns without seizures and with the same gestational age or with the same low birth weight.

P-037

Insular Surgery for epilepsy and tumors

R Malak (Montreal), A Bouthillier (Montreal), L Carmant (Montreal), P Cossette (Montreal), N Giard (Montreal), J Saint-Hilaire (Montreal), D Nguyen (Montreal)*

Background: Surgery in the insular region is rarely performed because of the inherent risks: proximity of deep structures such as the internal capsule and the basal ganglia, the arteries transiting in the insula, and the risk of compressing the opercula during the surgical approach. *Methods:* Retrospective study of patients operated for insular pathologies at the Notre Dame Hospital over the last 10 years. Subdural and neuronavigation-guided depth electrodes were implanted in The majority of epileptic patients. *Results:* Eight patients had insular operations: five for refractory epilepsy surgery, and three for tumor removal. Half of the resections were performed in the left hemisphere. After an average follow up of 35 months (range 3 to 89 months), all of the patients are seizure free, except one who has persistent auras. The majority of patients suffered from a minor reversible paresis that disappeared completely within a few months. There was no surgical mortality. *Conclusions:* Insular surgery is both safe and beneficial when it is well planned, and performed with modern microsurgical techniques and good anatomical knowledge.

P-038

Developing an effective program of ictal SPECT in an epilepsy unit

J Burneo (London), W Vezina (London)*

Background: Functional neuroimaging can address challenges of epilepsy localization, and sometimes preclude the need for intracranial electrodes. Ictal SPECT has developed into a critical tool in the presurgical evaluation of patients with medically-intractable localization-related epilepsy. The purpose of the study was to determine whether the development of a programme using trained nurses to perform ictal injections enabled a more efficient delivery of radiopharmaceuticals and therefore a higher specificity and sensitivity of outcome. *Methods:* In our ICU-like epilepsy-unit, nursing-staff inject doses of 99mTc-HMPAO at bedside, during or at seizure onset. Brain SPECT is performed later on a gamma camera equipped with high resolution collimators. *Results:* Since the implementation of the new protocol (February 2005), forty-six scans have been performed: 21 ictal and 25 interictal. Latency of ictal injection was found to be 10-40 seconds (mean 20.9 sec, SD 10.3), 18% of radiopharmaceutical vials were wasted, contamination rate was nil. *Conclusion:* Latency of injections and percentage of vials wasted indicated a very efficient protocol compared to what has been published in the literature. Our results show that ictal SPECT can be a safe, noninvasive procedure completed on a routine basis in the epilepsy unit when appropriately trained support staff are utilized as part of a structured multidisciplinary programme.

P-039

SPECT as a localizing tool in the partial epilepsies

S Abdool (London), W Vezina (London), A Parrent (London), S Baz (London), J Burneo (London)*

Background: Ictal SPECT provides a higher sensitivity for detection of seizure focus than that of structural imaging. We believe that SPECT can be used as an investigational tool looking for the site of subdural electrode insertion when surface EEG is unhelpful.
Methodology: A 30 year old, right-handed female, presented with seizures since childhood. She had stereotypical 1-10 attacks / day, starting with an aura of going down a roller coaster followed by laughing or crying, in addition to erratic motor movements, with impaired level of awareness for 30sec-2 min, and rapid recovery to baseline. Her physical examination was normal. Clinically a limbic seizure was expected. Continuous surface EEG monitoring, MRI brain, Ictal and Interictal SPECT were done. *Results:* Brain MRI showed right frontal transmantle cortical dysplasia, scalp EEG was inconclusive for localization. Ictal SPECT showed increased activity in the right frontal lobe which was concordant with the MRI result. Subdural electrodes were inserted accordingly. The recording showed typical attacks of right mesial frontal onset. Patient has been seizure free for six months post cortical resection of the epileptogenic zone. *Conclusion:* Ictal SPECT is useful in epilepsy for seizure focus localization prior to subdural insertion when surface EEG is inconclusive.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-040

Intractable Complex Partial Seizures (TLE) caused by Dysembryoplastic Neuroepithelial Tumour (DNET): An Adult Canadian experience

A Alshehri (Vancouver), M Jones (Vancouver)*

Methods: Patients with medically intractable temporal lobe epilepsy (TLE), who underwent tumour resection, who had a DNET, confirmed by surgical pathology, seen between 1995 and 2003 at Vancouver General Hospital Epilepsy program, and with a minimum follow up of 12 months, were selected. Medical records were reviewed for age at diagnosis, delay between seizure onset and tumour diagnosis, types and frequencies of seizures, MRI locations, EEG results, use of anticonvulsants, and extent of surgery. *Results:* Sixteen patients were identified. Mean age at surgery was 39 years with female: male ratio of 9:7. Eight tumours were mesial in the amygdala-hippocampal region and eight were temporal neocortical. All patients underwent a gross total tumour resection with an average follow-up of 30.6 months. The average delay between seizure onset and tumour diagnosis was 19.6 years. Eighty-seven percent of patients had an excellent outcome (Engel class I and II). *Conclusion:* Despite a long delay before DNET surgical removal, most (87%) patients had a good response to surgery. Other than gross total tumour resection, no other parameter predicted a good outcome.

P-041

Smoking cessation exacerbates seizure disorders

J Moeller (Halifax), D Weaver (Halifax)*

Background: Nicotine, a nicotinic acetylcholine receptor agonist, may be important in some forms of epilepsy. Diverse evidence from animal studies, molecular biology and clinical case reports suggest that chronic, low-dose nicotine could have therapeutic benefit in some patients with epilepsy. *Methods:* A case series of people with seizures exacerbated by smoking cessation was identified. Data on clinical features and timeline of smoking cessation were compiled. *Results:* We identified a case series of four individuals who experienced an exacerbation of their seizure disorder following smoking cessation. All had EEG-supported complex partial seizures. All were long-term, heavy smokers. At the time of smoking cessation, all patients were experiencing less than one seizure per week. None of the patients used aids to stop smoking. Two patients who stopped “cold turkey” experienced 5-6 seizures per day, starting 72 hours after smoking cessation. Upon restarting smoking, their seizures went back to the baseline level. Two patients who tried a slow taper from cigarettes experienced 1-2 seizures/day when they reached a level of 5 or fewer cigarettes per day. Over a period of 2-3 months, seizure frequency in these two patients returned to baseline. No other factors that could have caused an exacerbation of the seizures were identified. *Conclusions:* Nicotine withdrawal may exacerbate seizure disorders. The implications of this case series will be discussed.

P-042

Periventricular leukomalacia and post-neonatal epilepsy

C Pollioni (Parma), G Marchiò (Parma), L Sisti (Parma), F Pisani (Parma)*

Background: The aim of this study is to delineate the relation between periventricular leukomalacia (PVL), neonatal EEG abnormalities and subsequent epilepsy. *Methods:* Forty-four preterm infants less than 37 weeks of gestational age (age range 23 - 36 weeks) with PVL, consecutively admitted to the NICU of the University of Parma, were prospectively evaluated. PVL was diagnosed on the basis of neonatal Ultrasonographic findings during neonatal period and MRI findings during late infancy. Neonatal EEG was performed at three days, one week and two weeks of life and at discharge. A complete neurological assessment and Griffiths Mental Developmental Scales were carried out at 24 months of corrected age. Adverse outcome was defined as death, cerebral palsy (CP), epilepsy or a general developmental score for chronological age of < 80. *Results:* Twenty-four of the infants had bilateral cystic PVL. Thirty had an adverse outcome and 11 developed symptomatic localization-related epilepsy with focal motor seizures. The outcome was related to the low birth-weight ($p<0.032$), early gestational age ($p<0.03$) and chronic stage abnormalities in the neonatal EEG. Epilepsy was statistically related to the presence of bilateral cystic PVL ($p<0.005$). *Conclusion:* Infants with bilateral cystic PVL should be strictly followed-up because they are at high risk of epilepsy.

P-043

Focal brain injury following status epilepticus in a patient with known idiopathic primary generalized epilepsy

L Korngut (London), G Young (London), D Lee (London), S Mirsattari (London)*

Background: Idiopathic generalized epilepsy (IGE) may present with various forms of status epilepticus (SE). We report a patient with IGE who developed partial SE resulting in lateralized brain damage. *Methods:* A 24 year-old man with IGE since age nine years was found in prolonged SE with subtle motor seizures in the left arm and leftward gaze deviation. Duration and initial seizure characteristics were unknown because he was not seen for six hours prior to observed seizures. *Results:* Continuous EEG revealed right hemispheric partial SE refractory to midazolam, dilantin, phenobarbital, and maintenance anticonvulsants. Seizures were aborted with propofol infusion. MRI revealed signal changes in right hemispheric cortex. The patient recovered with persistent left hemiparesis on follow-up. MRI at 6 months revealed atrophy of the right cerebral hemisphere consistent with permanent focal neurologic injury. *Conclusion:* This patient with pre-existing IGE developed SE involving the right cerebral hemisphere resulting in focal neurologic injury. This case illustrates that IGE may present with partial SE and result in focal brain injury.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-044

Diffusion tensor imaging of the optic radiations following surgery for temporal lobe epilepsy

T Sankar (Edmonton), L Concha (Edmonton), M Knash (Edmonton), D Gross (Edmonton), C Beaulieu (Edmonton), B Wheatley (Edmonton)*

Background: Diffusion tensor imaging (DTI) permits in vivo delineation of white matter tracts (digital tractography) and quantification of their axonal integrity. Visual field deficit is a well-described complication of surgery for temporal lobe epilepsy (TLE), thought to result from injury to the optic radiation (OR) in the anterior temporal white matter (Meyer's Loop). In this study we assessed whether patients who undergo surgery for TLE have detectable, quantitative DTI abnormalities of the OR. *Methods:* Six patients with medically intractable TLE who underwent surgery were studied. All patients had a field deficit confirmed by formal visual field assessment. Pre- and post-operative diffusion-weighted imaging was obtained for each patient. Digital tractography of the ORs was performed using both a restrictive anatomical definition, and a liberal definition including more temporal lobe white matter. Fractional anisotropy (FA) values were computed for the segmented ORs and compared between pre- and post-operative conditions. *Results:* With the restrictive protocol, there was no difference in mean FA of the OR between healthy and pathological lobes pre- or post-operatively. With the liberal protocol, there was a strong trend towards a statistically significant reduction in mean FA in the pathologic lobe post-operatively (FA healthy=0.52±0.020, FA pathologic=0.48±0.012; p=0.0592). *Conclusions:* DTI strongly suggests the existence of quantifiable diffusion abnormalities in the OR following TLE surgery. An anatomical definition of the OR including more temporal lobe white matter facilitates detection of these abnormalities.

P-045

Voiding dysfunction in epileptic patients: a cross sectional study

M Motamedi (Tehran), S Ebrahimi Nasrabady (Tehran), M Nikobakht (Tehran), A Afshin (Tehran), A Orandi (Tehran), M Ashrafi (Tehran), F Tale Khatibi (Tehran), M Sahraian (Tehran)*

Background: Urinary incontinence in patients with epileptic seizures has often been discussed in the literature, but other voiding dysfunctions are rarely concerned. The present study wants to assess voiding dysfunction in epileptic patients and compare it with normal subjects. *Methods:* In this cross-sectional study, five symptoms of ictal and interictal voiding dysfunction (incontinence, frequency, urgency, retention and hesitancy) were compared between 81 clinically diagnosed epileptic patients and 70 control subjects with no history of seizure. The cases were between 12-50 years old. Cases with history of urogenital disorders were excluded. *Results:* The mean age of the cases and control subjects was 25.3 and 25.5 respectively. Within the case group the prevalence of incontinence, urgency, urinary frequency, hesitancy and retention were 27.2%, 17.3%, 12.3%, 7.4% and 6.2% respectively. The incontinence and urinary frequency were significantly higher in the case group compared to the control group (P-value <0.05 for both). *Conclusions:* Given that ictal and interictal incontinence and urinary frequency were common among epileptic patients, further attention should be paid to urinary complaints in epileptic patients. A thorough urological investigation (including sonographic and urodynamics studies) is advised for all symptomatic patients.

P-046

Neonatal status epilepticus and subsequent epilepsy

L Sisti (Parma), C Pollioni (Parma), G Marchiò (Parma), F Pisani (Parma)*

Background: the aim of this study is to evaluate the outcome of newborns with status epilepticus (SE). *Methods:* Fifty-five newborns at term with neonatal seizures consecutively admitted to the NICU were prospectively evaluated. Among them, 14 infants had neonatal SE and 41 had recurrent seizures (RS). Neonatal SE was defined as continuous seizure activity for at least 30 minutes or recurrent seizures lasting a total of more than 30 min without the patient fully regaining consciousness between seizures. Seizures were Video-EEG confirmed. A complete neurological assessment and Griffiths Mental Developmental Scores were assessed at least at six months of age. Adverse outcome was defined as death, cerebral palsy (CP), general developmental (GD) score for age < 80 and epilepsy. *Results:* At the last follow-up, among the infants with neonatal SE, 2 patients died, 7 developed CP, GD delay and epilepsy, 3 had CP and GD delay, 1 had only epilepsy and 1 had a normal outcome. Among the infants with RS, 26 had a normal outcome and 15 had an adverse outcome. Epilepsy was present in 4 patients. Neonatal SE was significantly related to post-neonatal epilepsy (p< 0.05). *Conclusions:* Newborns with SE are at high risk of epilepsy.

P-047

Evaluation of the metabolic profile and cortical reorganization in epileptic malformations of cortical development (MCD)

J Burneo (London), R Bartha (London), F Bihari (London)*

Background: In a previous study using magnetoencephalography, patients with epileptic MCD were found to have reorganization if the MCDs are due to an abnormal neuronal or glial proliferation (i.e., cortical dysplasia) but that was not the case in MCDs caused by abnormal cortical organization (i.e., polymicrogyria). In the present study we performed a preliminary look at data from a large project studying the metabolic profile and the organization of the sensorimotor cortex of epileptic MCD. *Methods:* We studied a patient with a malformation of cortical development (polymicrogyria) and epilepsy using 4.0 Tesla proton single voxel MRS and fMRI (motor and sensory paradigms). The creatine to N-acetylaspartate ratio (Cr/NAA) and Choline to NAA ratio (Cho/NAA) were compared between the cortical malformation and the healthy hemisphere. *Results*: In this single subject, the polymicrogyric tissue had a comparable metabolic profile with a homogeneous healthy cortical area in the contralateral hemisphere, and the pattern of localization in fMRI was as expected in spite of the extensive malformation, when compared with healthy hemisphere and controls.. *Conclusion:* These preliminary MRS- and fMRI-based findings indicate that polymicrogyric tissue behaves as healthy (non-MCD) cortical tissue. The results must be validated in more subjects and expanded, as we collect information in other types of MCD.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-048

Radiofrequency thermoablation in lesional epilepsy: A case report

J Pugh (Edmonton), D Gross (Edmonton), J McKean (Edmonton), M Wheatley (Edmonton)*

Background: Depth electrode recordings are sometimes required to identify epileptic foci in patients with epilepsy, particularly in cases when standard noninvasive investigations - surface electroencephalography, neuroimaging, and neuropsychologic assessment - yield incongruous results. The use of these depth electrodes to create radiofrequency (RF)-thermolesions has recently been described. *Methods:* A total of 4 stereoelectroencephalograhy (SEEG) electrodes, each containing eight 2 mm platinum-iridium contacts over 50 mm, were inserted for depth electrode recording from the supplementary motor area, cingulum, and superior and middle frontal gyri. SEEG recordings demonstrated constant interictal activity between three contacts of a single depth electrode with ictal spread to adjacent electrodes. This corresponded to an area of transmantle cortical dysplasia in the right middle frontal gyrus. Given the localized focus of epileptic activity, we performed an RF-thermoablation between contacts 3-4 and 4-5 as a primary attempt to destroy the epileptogenic center. *Results:* A solitary 10 mm x 8 mm lesion was created within the cortical dysplasia of the right middle frontal gyrus. This patient demonstrated an early cessation in seizure activity with delayed recurrence. *Conclusion:* RF-thermoablation is a primary treatment option for patients with localized epileptogenic foci. As there is a natural delay between recording and surgery, a trial is planned to evaluate those patients who may benefit from RF-thermoablation alone.

P-049

Plasticity of language areas of the brain in adult patients with medically refractory temporal lobe epilepsy following temporal lobectomy

L Jong (London), D Bandur (London), F Bihari (London), D Lee (London), D Steven (London), A Parrent (London), S Pigott (London), S Mirsattari (London)*

Background: Few detailed studies of language outcomes following temporal lobectomy (TLY) for patients with medically intractable temporal lobe epilepsy (TLE) have been reported. It remains unknown if there are alterations in the anatomical areas recruited for language. *Methods:* Functional magnetic resonance imaging (fMRI) was used to investigate brain plasticity for language following TLY in eight patients with medically refractory TLE. Three patients underwent left TLY (mean age 46.3 ± 11.6 years) and five underwent right TLY (mean age 29.2 ± 7.2 years). Patients silently generated verbs in response to a series of visually presented nouns. Data were analyzed based on region of interest (ROI) activations for inferior frontal gyrus (IFG), midfrontal gyrus (MFG), and Wernicke area (WA). Hemispheric dominance for language was determined using asymmetry indices (AI); AI >0.20 classified as left dominant; AI <0.20 as atypical. *Results:* Patients that underwent LTLY had increased activation in the RMFG following surgery, and decreased activation in all other areas. The RTLY patients increased activation in all ROIs post-operatively. AI increased in LTLY patients for WA and IFG, but decreased for MFG. *Conclusions:* Brain plasticity in TLY patients occurs both in frontal regions adjacent to area of resection and in the contralateral hemisphere.

P-050

VNS therapy for medically refractory epilepsy: five years later

F Gonzalez (Halifax), D Clarke (Halifax), M Sadler (Halifax), S Rahey (Halifax)*

Background: Vagus nerve stimulation (VNS) in our institution has been used as adjunctive treatment for patients with medically refractory epilepsy and for whom no other surgical options are available. The primary goal of this study is to examine the long-term usefulness of VNS in these patients. *Methods:* Charts of all adult patients who had VNS (Cyberonics Inc., Texas) implantation and follow-up of at least four years were reviewed. Twenty-one patients met these criteria: the mean age was 39 years, the pre-implantation mean epilepsy duration was 28.8 years and 12 patients had previous brain surgery,. VNS therapy was considered "useful" if the stimulator was still functioning and "not useful" if the pulse generator was not functioning or if battery replacement would not be considered. *Results:* VNS was considered "useful" in six (28.6%) patients, of which none were seizure-free and two had a >50% reduction in seizure frequency. VNS was not useful in 15 (71%); one became seizure-free, and another had a 95% reduction in seizure frequency, after the batteries were turned off. *Conclusion:* A review of our patients who have received VNS therapy indicates that it remains useful in approximately one in four patients at five years.

P-051

Functional MRI characteristics of focal cortical dysplasia not associated with seizure onset

S Mirsattari (London), F Bihari (London), J Danckert (Waterloo)*

Background: Focal cortical dysplasias (FCDs) are variable in their capabilities to support cognitive functions likely due to the heterogeneity of their underlying pathologies. The purpose of this study was to examine the relationship between epileptic properties and cognitive function in a patient with FCD. Methods: We studied clinical, electroencephalography (EEG), neuropsychological, and functional MRI (fMRI) findings in a 21 year-old patient with medically intractable epilepsy since age 16 years secondary to FCD in the left temporal lobe. Invasive EEG monitoring including strereotactic implanted depth electrodes showed that the dysplastic tissue was not involved in the onset of his seizures. We used fMRI to test basic visual perception, motion and object processing, recognition memory and language functions. A custom-designed software (Atamai, Inc.) was used to co-register the automatically segmented pre-surgical 3-D brain T1 MR images, segmented post-surgical CT images containing subdural electrode only and fMRI data to develop an accurate three dimensional volume rendered brain displaying the relationship between epileptogenic zone in subdural map to fMRI activation maps. Results: No fMRI task led to activation within the dysplastic tissue, with significant asymmetries in motion processing and memory performance evident in areas outside the dysplastic region. Conclusion: We concluded that non-epileptogenic FCD did not support cognitive function.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-052

PLEDS: clinical correlates

W Fitzpatrick (Saskatoon), N Lowry (Saskatoon)*

Background: Periodic lateralized epileptiform discharges (PLEDS) are classically associated with acute necrotizing cerebral lesions. We reviewed our experience in 83 consecutive cases to ascertain the responsible pathology and assess the accuracy of this premise. *Methods:* EEG reports from Jan1,1999 to Nov30,2005 were screened for the terms 'PLEDS' and its variants. 83 patients were identified. All EEGs were read by a single neurologist. A retrospective chart review was conducted to determine the underlying etiology. *Results:* Of the 83 patients in our series, 55 had unilateral PLEDS, 9 had unilateral PLEDS Plus, and 2 had unilateral PLEDS or PLEDS Plus with contralateral independent sharp waves. BiPLEDS were found in 13 patients, bilateral PLEDS Plus in 2, and 2 patients had BiPLEDS with unilateral PLEDS Plus. Seizure activity occurred in 87%. Etiologies included mass lesions, cerebral infarction, intracerebral hemorrhage, traumatic brain injury, viral encephalitis, bacterial cerebritis, and acute demyelination. Atypical pathologies included PRES, Hashimoto's encephalopathy, Rasmussen's encephalitis and alcohol related seizures in association with diffuse cerebral atrophy. *Conclusions:* This case series demonstrates that PLEDS may be caused by a wide variety of pathologies, and adds several new entities to the differential diagnosis.

P-053

Acquired epileptic apraxia with response to steroids

W Fitzpatrick (Saskatoon), N Lowry (Saskatoon)*

Background: Epileptic aphasia or the Landau-Kleffner syndrome may be associated with articulatory apraxia. Isolated oral motor apraxias have been described with Rolandic epilepsy. Epileptic limb apraxia is probably a related entity. *Methods:* Case report. *Results:* A developmentally normal right handed female presented at age seven with escalating seizure frequency. She had a three year history of simple and complex partial seizures affecting her left face, arm and leg, as well as a gradually progressive left hand apraxia. She had been treated with carbamazepine, and subsequently developed myoclonic and atypical absence seizures. Neuroimaging and metabolic workup were normal. EEG showed almost continuous right hemispheric slow spike and wave discharges. Treatment was changed to lamotrigine with significant improvement in seizure control, but no improvement in hand function. Repeated EEGs showed bicentral, maximal right central, spikes which became nearly continuous in sleep. She received a three month trial of prednisone, with dramatic clinical response. She became seizure free, and left hand praxis markedly improved. Her EEG normalized. *Conclusions:* This case demonstrates a relationship between the disorders of epileptic apraxia and aphasia and suggests therapy for acquired apraxia related to seizure activity.

P-054

Prevalence of the photoparoxymsmal response (PPR) in pediatric electroencephalographs in Saskatoon

M Shapiro (Saskatoon), N Lowry (Saskatoon)*

Background: Intermittent photic stimulation is used routinely as an activation procedure for EEGs. Prevalence rates of PPRs have varied largely, with results reported anywhere between 0.6-10% of epileptics. In their large-scale investigation, Quirk et al. reported an overall PPR incidence of 2%, and 10% in patients aged 7-19. Many studies have shown higher rates of PPRs in females. *Methods:* All EEGs performed from June 2004 to May 2005, on patients 18 years or younger, at the Royal University Hospital in Saskatoon were included. Those EEGs in which photosensitivity was reported were reviewed and prevalence rates were determined. *Results:* The overall prevalence rate of PPRs was 23/1000 or 2.3%. The female to male ratio was 1.7:1. *Conclusions:* These results are generally lower than those reported in previous studies. This is likely due to the fact that our population was not restricted to epileptics, as our lab supplies the only EEG service to the northern part of the province and the patients have a wide referral base. Our findings, therefore, may reflect a more realistic prevalence of photosensitivity in this age group.

P-055

Epilepsy associated with a Cerebellar Arachnoid Cyst: Seizure control following fenestration of the cyst

P Gan (Vancouver), M Connolly (Vancouver), P Steinbok (Vancouver)*

Background: The role of the cerebellum in the pathogenesis of seizures remains controversial. Cerebellar origin of seizures, albeit rare, has been described in literature in association with intrinsic lesions of the cerebellum. We present a unique case of a patient with medically intractable, secondary generalized epilepsy, associated with a superior cerebellar quadrigeminal arachnoid cyst. *Clinical Presentation:* A 9 year old child presented with medically refractory secondary generalized epilepsy associated with recurrent headaches since 6 months of age. The child also had moderate intellectual impairment and autism. On MRI head, he was noticed to have a small superior cerebellar arachnoid cyst in the quadrigeminal area that has increased in size slightly. Interictal EEG was unable to localize the site of the epilepsy. Neurological examination was unremarkable. *Intervention:* A suboccipital craniotomy and supracerebellar infratentorial approach to the cyst was performed at 9 years of age. Intraoperative ECOG demonstrated epileptic activity from the cerebellar tissue adjacent to the cyst. The cyst was fenestrated and the cyst wall was sent for histology. Seizure control improved dramatically following fenestration of the cyst. *Conclusion:* This case provides strong evidence that, albeit rare, the cerebellum may be a source of epileptic activity due to compression by a lesion in the posterior fossa. Hence, in cases with intractable epilepsy of unknown supratentorial source, the differential diagnosis should include a posterior fossa lesion. The finding of a posterior fossa lesion in such cases, even if it is small and appears benign, should precipitate a discussion about the possible relationship between the posterior fossa lesion and the epilepsy.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-056

Melatonin exerts anticonvulsant effects via nitric oxide pathway in mice

N Yahyavi-Firouz-Abadi (Tehran), P Tahsili-Fahadan (Tehran), K Riazi (Tehran), M Ghahremani (Tehran), A Dehpour (Tehran)*

Background: Melatonin, the major hormone produced by the pineal gland, is shown to have anticonvulsant effects. Nitric oxide (NO) is a known mediator in seizure susceptibility modulation. In this experiment involvement of NO pathway in the anticonvulsant effect of melatonin in pentylenetetrazole (PTZ)-induced clonic seizures was investigated in mice. *Methods:* The effect of intraperitoneal administration of melatonin, and its combination with nitric oxide synthase(NOS) substrate, L-arginine, and different NOS inhibitors were assessed. *Results:* Melatonin (40, 80 mg/kg) significantly increased the clonic seizure threshold induced by intravenous administration of PTZ. Combination of per se non-effective doses of melatonin (10 and 20 mg/kg) and L-arginine (30, 60 mg/kg) showed a significant anticonvulsant activity. This effect was reversed by NOS inhibitor N(G)-nitro-l-arginine methyl ester (L-NAME, 30 mg/kg), implying an NO-dependent mechanism for melatonin effect. Pretreatment with L-NAME (30 mg/kg) and N(G)-nitro-l-arginine (L-NNA, 10 mg/kg) inhibited the anticonvulsant property of melatonin (40 and 80 mg/kg) and melatonin 40 mg/kg, respectively. Specific inducible NOS (iNOS) inhibitor aminoguanidine (100 and 300 mg/kg) did not affect the anticonvulsant effect of melatonin, excluding the role of iNOS in this phenomenon, while pretreatment of mice with 7-nitroindazole (50 mg/kg), a preferential neuronal NOS inhibitor, reversed this effect. *Conclusion:* The present data show an anticonvulsant effect for melatonin in i.v. PTZ seizure paradigm, which may be mediated via NO/L-arginine pathway by constitutively expressed NOS.

P-057

Effect of acute and chronic light/dark cycle alteration on seizure threshold in mice: modulation by melatonin

P Tahsili-Fahadan (Tehran), N Yahyavi-Firouz-Abadi (Tehran), K Riazi (Tehran), A Dehpour (Tehran)*

Background: Changes in seasonal and circadian rhythms have been shown to alter the anticonvulsant properties of various drugs. In this study, we have investigated the effect of light/dark (LD) cycle alteration on pentylentetrazol (PTZ)-induced clonic seizure threshold in male mice. *Methods:* In acute experiments, LD cycle of two groups of mice were changed from 12/12 to 8/16 or 16/8 LD cycles and seizure threshold was determined at zeitgeber time (ZT)=4 of the next day. In chronic experiments, three distinct sets of mice were maintained on 12/12, 8/16 and 16/8 LD cycles for two weeks prior to testing. *Results:* Acute LD cycle alterations (both 8/16 and 16/8) decreased seizure threshold significantly in comparison to animals under 12/12 LD cycle. This pro-convulsant effect was reversed by single i.p. administration of melatonin (10 mg/kg) at ZT=10 of the first day. In chronic experiment, mice maintained on shorter photoperiod showed a significant decrease in seizure threshold while keeping animals under longer photoperiod did not produce a significant pro-convulsant effect compared to animals under 12/12 LD cycle. Chronic i.p. administration of melatonin (10 mg/kg) at ZT=10 in the shorter photoperiod group reversed the effect of LD cycle alteration on seizure threshold. *Conclusion:* These results suggest that both acute and chronic alteration of LD cycle may influence the seizure susceptibility and this effect could be modulated by administration of exogenous melatonin.

General Neurology

P-058

Antihistamine Overdose Mimicking Brain Death

A Alkhotani (London), G Young (London)*

Introduction: Antihistamines are widely available & commonly used in suicide attempts. Different neurological manifestations from antihistamine overdose vary from agitation and seizures to coma. *Method:* We report a case of a 30 year old woman with diphenylhydramine overdose whose case mimicked brain death. *Results:* The patient presented in a coma of initially unknown cause, with absent brain stem reflexes and tachycardia. Electroencephalography (EEG) demonstrated generalized suppression under 10 microvolts, compatible with anoxic encephalopathy. Computed tomography (CT) magnetic resonance imaging (MRI) were normal. Toxic screen was positive for diphenhydramine but negative for benzodiazepines, cocaine and opioids. Within twenty-four hours EEG recovered spontaneously and a day later she obeyed commands. She died several days later of adult respiratory distress syndrome. The brain showed no anoxic-ischemic change at post-mortem. *Conclusion:* Antihistamines can produce clinical and EEG suppression which mimic anoxic encephalopathy and brain death, but spontaneous neurological recovery is possible.

P-059

Functional Imaging of Motor Speech Areas, The Role of Employed Tasks and Analysis Thresholds

A Mahdavi (Tehran), H Saberi (Tehran), M Oghabian (Tehran)*

Objectives: The dilemma of determination of the dominant hemisphere as well as speech associated cortices has been of utmost importance, but difficult to resolve. In this preliminary study we have employed functional Magnetic Resonance Imaging to observe and delineate regional brain activation patterns during execution of language related tasks. *Methods:* Our healthy volunteers comprised of 11 right-handed males. All the subjects performed two consequent new language tasks namely; “Word Production” and” Reverse Word Reading”. FMRI DATA analysis was carried out using FSL software. Laterality indices were calculated in regions of interest with different threshold levels. *Results:* Amongst nine eligible cases, the brain regions involved in motor language processing, could be activated and presented on functional images. In eight out of nine subjects, these regions were exclusively located in the left hemisphere corresponding to conventional Broca’s area and in one case in the right inferior frontal gyrus. *Conclusion:* That images show enhanced quality and contrast. These promising results may be of value to determine the dominant hemisphere and elucidate the exact location of the motor speech areas by a non-invasive method, or as an adjunct to conventional invasive methods. We recommend functional

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

imaging of language cortices employing the above mentioned tasks. Besides, the presented visual tasks and analytic thresholds could specially produce acceptable contrast in regions concordant with predicted traditional language centers. Estimation of the exact sensitivity and specificity of the methods however requires simultaneous employment of conventional functional investigations as well as larger subject populations.

P-060

MR Spectroscopy in Hypoglycemic Encephalopathy

G Hunter (Saskatoon), S Harder (Saskatoon)*

Introduction and Background: With the expanding utility of MR spectroscopy (MRS), it is important to establish baseline characteristics of neuropathologies with known conventional MRI appearances. To our knowledge, MRS findings in hypoglycemic encephalopathy have not been described. We present a case of hypoglycemic encephalopathy with classic conventional MRI findings and compare the MR spectroscopy characteristics. *Case Summary:* A 22 Year old non-diabetic female with a history of fetal alcohol syndrome was transferred to our hospital after being found unconscious following excessive alcohol use the prior evening. Emergency services reported a serum glucose of 1.2 mmol/L and treated the patient with a dextrose infusion. The patient was then intubated with a GCS of 8 and transferred to our center. Her serum glucose was 1.5 mmol/L in the emergency department and a second infusion of dextrose was initiated. Investigations revealed a negative screen for toxic ingestions, including methanol, ethanol, and carbon monoxide. *Imaging:* Conventional MRI revealed bilaterally symmetric T2 hyperintensities in the caudate heads and putamena. Diffusion weighted imaging (DWI) revealed corresponding T2 shinethrough and a lack of diffusion restriction on ADC mapping. MR Spectroscopy (MRS) with Multivoxel PRESS acquisition (TR/TE=3000/144msec) demonstrated diminished NAA and a small lactate peak in the left caudate nucleus. *Discussion:* The conventional MRI findings of T2 hyperintensities in the caudate and putamena have been described in association with hypoglycemia. We describe the first MRS examination of hypoglycemic injury, with findings suggestive of neuronal loss (decreased NAA) and metabolic insufficiency (lactate peak), consistent with known pathophysiologic mechanisms.

P-061

On the Da Vinci dominant laterality

G Rémillard (Montreal), B Zifkin (Montreal), F Andermann (Montreal), J Morissette (Montreal), J Montplaisir (Montreal)*

Objective: To determine the laterality of facial asymmetry perceived as more attractive. *Background:* Da Vinci drew attention to the deviation of the mouth and elevation of the horizontal line of the lips closer to one eye during expression of emotions. *Design/Methods*: Photographs of the faces of 14 persons (7 with a smile expressed more on the right and 7 on the left side of the face), were reproduced and inverted. All had slight to moderate asymmetric smiles. They were unknown to 10 right handed observers (aged 23 to 58 years) who were asked to point to one of the two identical but inverted faces that they chose as more attractive and pleasant. In addition the ten observers were asked to choose between two versions of simple face drawings that were perfectly symmetric except for right and left asymmetry of the smile. *Result:* Of the total 14 smiling faces evaluated by 10 individuals, 85 (60%; chi square, $p = 0.07$) were those with mouth deviation to the left compared to 55 for the inverted image. Likewise of the 7 whose genuine smile was expressed more on the right, 60% of the time the subject preferred the inverted image of those faces with the smile artificially expressed more on the left. Left-right smiling preference remained similar (70%; chi square, $p = 0.004$) for inverted drawings of 2 faces, where the only variable was a slight to moderate slanting deviation of the mouth from left to right in one and from right to left in the other. *Conclusions:* Smiles with mouth deviation towards the left more often appeared attractive.

P-062

Marchiafava Bignami Disease in a Nonalcoholic on Kidney Dialysis

I Derakhshan (Charleston), E Bourekas (Columbus)*

SE was a 50 years old right handed woman with chronic renal failure on dialysis. She suddenly developed weakness in her left leg. Upon hospitalization, MRI of the brain showed the unexpected finding of demyelinization of the entire corpus callosum, with no other lesions of the brain. Another MRI of brain six months earlier had been normal. In between the two procedures she had undergone hemodialysis on an outpatient basis; three times per week, using unfortified dialysate. Levels of B1 and B6 vitamins were below the normal range. The mild but definite weakness involving the entire left side of the body was more severe in the leg and was associated with hyper-reflexia. Despite the extensive involvement of the callosum she was able to walk with no support and her bimanual coordination was undisturbed. These were taken as evidence that the demyelinating callosal fibers were still functional despite the MRI's appearance. Her neurological condition improved few days after supplementation of vitamins by injection. Although cases of demyelization involving pontine and Wernicke regions have been described in chronic dialysis patients, extensive search of the literature failed to reveal a case similar to SE. This case suggests advisability of nutritional supplementation of renal dialysate in similar cases. MRIs of the case will be shown.

P-063

Optic neuritis as the first manifestation of syphilis: A case report and review of articles

M Meratee (Los Angeles), S Potrebic (Los Angeles)*

Background: Syphilitic involvement of the optic nerves represents a heterogeneous group of conditions. The exact incidence of ocular syphilis is unknown.In this review, the differential diagnosis and treatment of syphilitic optic neuropathy is described. *Design/Method:* Review was conducted of the literature and pertinent clinical trails. *Case Report:* A 44-year-old white male noted the sudden onset of decreased vision in the left eye. His visual acuity was 20/20 in the right eye and 20/400 in the left eye. Fundoscopy was normal in the right eye, and in the left eye the optic nerve was swollen with splinter hemorrhages. He had elevated ESR, negative ANA, and

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

reactive RPR. Lumbar puncture showed normal opening CSF pressure, elevated WBC with lymphocytic predominance and positive CSF VDRL titer. FTA-ABS was positive for syphilis. Serum and CSF antibodies to HIV were negative. He received high dose of intravenous aqueous penicillin for 10 days. Four weeks later his vision improved to 20/25 in the left eye. *Result:* Early diagnosis of syphilitic optic neuritis is important, due to potentially sight-threatening sequelae of syphilitic eye disease, which strongly suggests involvement of the central nervous system. A history of chancre or primary infection may be absent, as in our patient. The diagnosis of syphilitic optic neuritis is established using a variety of serologic and CSF assay. Differential diagnostic considerations included other processes that can cause optic neuropathies with disc swelling, such as idiopathic optic neuritis, inflammatory optic neuropathies, lyme-associated optic neuropathy, infiltrative optic neuropathy, and primary optic nerve tumors. *Conclusion:* Since the presentation of syphilitic optic neuropathy is quite variable, the clinical suspicion for this condition must exist in all cases of atypical inflammatory optic neuropathy and unexplained progressive optic atrophy. Treatment with intravenous penicillin produces visual recovery in many cases; however, the disease may be difficult to cure, particularly in patients who are HIV-positive or who have acquired immunodeficiency syndrome.

P-064

Severe involvement of the corpus callosum on diffusion-weighted imaging despite normal conventional magnetic resonance imaging in global hypoxia: report of a case

M Ziller (Sherbrooke), J Boulanger (Greenfield Park)*

Background: Diffusion-weighted imaging (DWI) is more sensitive than conventional magnetic resonance (cMRI) in the context of global hypoxia. The corpus callosum is relatively resistant to hypoxic changes and its involvement is atypical in anoxic/hypoxic encephalopathy. *Methods:* We present a case of global hypoxia and its MRI associated findings. *Results:* A 27 year old patient with idiopathic epilepsy presented to the emergency room after a prolonged generalized status epilepticus. Magnetic resonance (MRI) including DWI and apparent diffusion coefficient (ADC) were performed 7 days after admission. Diffusion-weighted imaging/ADC showed extensive cortical and white matter lesions compatible with cytotoxic oedema while the cMRI and head CT scan were normal. The corpus callosum was diffusely and severely involved. Repeated electroencephalograms (EEGs) revealed no reactivity and a severe attenuation of background rythms. The patient remained comatose and died two weeks after her admission. *Conclusion:* Severe cytotoxic oedema of the corpus callosum on DWI despite normal cMRI is atypical in patients with global hypoxia and could be more common among those with hypoxia presenting after a generalized status epilepticus. This may reflect the involvement of the subcortical white matter tracts during the ictus. It may also represent a marker of poor prognosis.

P-065

Carbon monoxide: A silent and potentially lethal cause of headache

M Bussiere (London), D Nicolle (London), S Venance (London)*

Background: Carbon monoxide ("the silent killer") is a colorless, odorless and tasteless gas produced by the incomplete combustion of carbon containing fuels. Symptoms of chronic intoxication are insidious and non-specific, depending on concentration and length of exposure. We review a patient presenting with occupational exposure to carbon monoxide. *Methods:* A 26 year old male presented with a 2 month history of low grade, bilateral throbbing retro-orbital headaches. There was no diurnal variation. Headaches were not exacerbated by changes in posture or straining. There was no associated nausea, photophobia or focal neurological symptoms. Headaches occurred daily, shortly after arriving at work and resolved within a few hours of leaving work. The patient operated a propane-powered forklift in a poorly ventilated recycling factory. *Results:* Neurological examination was remarkable for moderate bilateral optic disk swelling with underlying retinal hemorrhages. There were no focal deficits. Computed tomography and MRI of the brain, including venography, were normal. Subsequent workplace safety inspection revealed unacceptably high levels of carbon monoxide. Headaches and optic disk swelling gradually resolved with time away from the factory. *Conclusions:* A high degree of suspicion is required to diagnosis this silent, and potentially deadly, cause of headache.

P-066

VZV Associated Transverse Myelitis in a Patient with Agammaglobulinemia

C Hrazdil (Edmonton), S Kalra (Edmonton), M Hussain (Edmonton)*

Background: Varicella-zoster virus (VZV) remains latent in the nervous system and can subsequently reactivate as herpes zoster. Reactivation has been associated with a number of central and peripheral nervous system syndromes, and the diagnosis is often a challenge. We report a case of transverse myelitis with prominent anterior horn cell dysfunction associated with VZV infection in an immuncompromised patient. *Methods:* Case Report/Literature Review. *Case Presentation:* A 55-year-old man with untreated agammaglobulinemia presented with a viral prodrome, meningismus, progressive diffuse weakness, decreased vibration sense to the knees, hyporeflexia, and an inconspicuous abdominal rash. Serum immunoglobulins were decreased, and CSF analysis revealed lymphocytosis with increased protein. T2-weighted hyperintensity in the C-spine was compatible with transverse myelitis. EMG studies in the acute period demonstrated decreased motor unit recruitment. VZV DNA was detected in CSF by PCR. Deterioration, particularly with the development of muscle atrophy, and then stabilization followed over several weeks. There was limited clinical improvement with acyclovir, prednisone, and IVIg. *Discussion:* Our patient's immunocompromised state may have predisposed him to VZV reactivation which resulted in transverse myelitis with prominent anterior horn cell dysfunction. CSF PCR was diagnostic and treatment may have ceased further disease progression.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-067

Lateral rectus metastasis from an occult systemic malignancy masquerading as abducens palsy

M Masoud (Stirling), A Rehman (Stirling), P McDermott (Stirling), M Shaikh (Stirling)*

Background: Orbital metastasis as an initial manifestation of systemic malignancy presenting as diplopia is a rare scenario. Although myogenic causes for the muscle palsy are well known, the metastatic muscle involvement as a cause of the paretic squint is rarely discussed in the literature. *Methods:* A Case Report. A 75 year old lady developed an acute painless right abduction deficit in a quiet eye with no gross orbital signs and symptoms. She was generally unwell. CT scan brain was found to be normal. Clinically saccadic velocity was unimpaired and there was very subtle injection around the muscle insertion. CT orbits revealed a metastatic mass in the right lateral rectus. Systemic evaluation confirmed widespread thoracic and abdominal metastasis from an occult systemic malignancy. *Result:* The abduction deficit masquerading as a lateral rectus paresis was in fact the orbital metastatic manifestation of an occult systemic malignancy. *Conclusion:*

1 A paretic ocular abduction deficit can be a metastatic myogenic palsy.
2 An isolated metastatic lateral rectus involvement can be present with minimal local signs and no history of systemic malignancy. The clinician should avoid the pitfall of presuming such an abduction deficit in the elderly as a benign neurogenic palsy.

P-068

Posterior reversible encephalopathy syndrome (PRES): a case series with variable causes

C Odier (Montreal), G Matte (Montreal), C Chayer (Montreal), D Nguyen (Montreal), S Lanthier (Montreal)*

Background: Posterior reversible encephalopathy syndrome (PRES) typically features headaches, altered consciousness, seizures, visual deficits and vasogenic posterior cerebral oedema. PRES classically results from severe hypertension, immunosuppression therapy, and eclampsia. *Objective:* To identify other potential causes of PRES. *Methods:* We analyzed conditions associated with typical PRES from two hospital-based populations in 2005. *Results:* Six individuals with blood pressure of 130-180/70-101 mmHg presented headaches (n=5), seizures (n=4), altered consciousness (n=4), cortical blindness (n=3), visual hallucinations (n=2), Balint syndrome (n=1), aphasia (n=2), and hemiparesis (n=1). Initial diagnoses were cerebral venous thrombosis, basilar artery thrombosis, post-partum eclampsia, and thrombotic thrombocytopenic purpura. Brain MRI revealed vasogenic posterior cerebral oedema without diffusion restriction, consistent with PRES. Selective cerebral or MRI angiography disclosed no venous or arterial thrombosis. PRES resulted from immusuppression therapy (n=2), eclampsia (n=1), or no classical cause (n=3). In the latter group, associated conditions were moderate hypertension (177-180/96-101 mmHg; n=2), low-dose methotrexate (n=1), remote cisplatin therapy (n=1), blood transfusion (n=1), and hypomagnesaemia (n=1). Symptoms resolved within 1-14 days with treatment of underlying causes and associated conditions. *Conclusion:* Severe hypertension, immunosuppression therapy, and eclampsia are frequently absent in typical PRES. Potential causes include moderate hypertension, low-dose methotrexate, remote cisplatin therapy, blood transfusion, and hypomagnesaemia.

P-069

Predictors of mortality with gram negative bacteremia

J Fraser (London), J Burneo (London), Z Hussain (London), Z Hutchinson (London), J Wilson (Buffalo), G Young (London)*

Background: Some preliminary studies have suggested that women with sepsis have a higher mortality than men. In preliminary work, we found that young men and women with Gram-negative bacteremia had similar outcomes. We therefore examined a population of patients over age 50 years with Gram-negative bacteremia to explore possible predictors of mortality in this, more vulnerable, population. *Methods:* We reviewed the charts of 212 patients over age 50 with Gram-negative blood cultures in 2000-2001. The following data were tabulated: age, gender, microorganism, source of infection, comorbidities, peak glucose level, estrogen use, and outcome (death versus survival). Univariate and multivariate logistical regression models were used for analysis. *Results:* Hyperglycemia was found to increase the odds of death (OR=3.0 ($CI_{95\%}$=1.1-8.4)), while UTI and line sepsis were protective compared to pneumonia (OR=0.2 ($CI_{95\%}$=0.1-0.5), and OR=0.2 ($CI_{95\%}$=0.1-0.7), respectively.) No significant difference in outcome was seen with gender, microorganism, presence or absence of comorbidities, use of estrogens, age, and source of infection. *Conclusion:* In patients over age 50 with Gram-negative bacteremia, hyperglycemia increased the odds of death. UTI and line sepsis had survival benefit relative to pneumonia. Gender, age, species of microorganism, and other concomitant major comorbidities were not associated with significant differences in mortality.

P-070

MSG Induced Headaches

A Rana (Scarborough), D Munroe (Scarborough)*

Backround: J.B is a 30 year-old right-handed female with headaches. Her headaches began to intensify and became more frequent in June of 2005. She got headaches one to two times a week, starting late in the morning, lasting all day and accompanied by fuzzy vision. She had difficulty with concentrating during headaches. The patient had a family history of migraines in her cousin, which improved upon avoiding the intake of chips. *Methods:* A CT scan of her head was normal, she was diagnosed with the common migraine, and was advised to explore the dietary triggers of her headaches. The patient was given a list of dietary ingredients which could cause her headaches to return. *Results:* She excluded monosodium glutamate from her diet and her headaches resolved completely. *Conclusion:* From the results, JB exhibits symptoms of the common migraine. We conclude that monosodium glutamate induces headaches, and its exclusion from the diet may reduce the use of headache medication in the future.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-071

Case Report: Myokymia Cramp Syndome

A Datta (Edmonton), S Ebenezer (Saskatoon), T Jeerakathil (Edmonton)*

Background: Primary myokymia-cramp syndrome (PMCS) is a rare disorder, consisting of cramps in the extremities and myokymia. PMCS is a benign condition with controversial etiology. Delay in diagnosis can impair quality of life. A unique case of PMCS is presented, which should alert clinicians to new presentations. *Methods:* We present a case of a 54 year old male with painful cramps and rippling of his muscles in the arches of his feet. After extensive workup, PMCS was diagnosed. A literature search on MCS was done employing Pubmed. MCS was entered into the search engine, with dates from 1950-2005. Our case in the context of the existing literature was analyzed. *Results:* Our literature review yielded only a few case reports. Analysis of all cases showed that patients were affected in varying extremities. Some cases revealed an etiology for the MCS. Only reports of PMCS were included in this study. Our case is unique in that only the feet are involved. *Conclusion:* PMCS is rare and a diagnosis of exclusion. Although benign, it can greatly impair patient's lives. PMCS should be considered in patients presenting with only symptoms in the feet. Pathophysiology and treatment algorithms are discussed.

P-072

The aggregative properties of proteins with polyalanine domains

A Klein (Montreal), C Alexander (Montreal), M Ebihara (Montreal), M Dicaire (Montreal), B Brais (Montreal)*

OPMD is a disease caused by an expansion of the polyalanine domain in PABPN1, which is an essential polyadenylation factor. The characteristic of the disease is the formation of intranuclear inclusions (INI) in the skeletal muscle fibers. To date, eight other diseases caused by mutations in a polyalanine-coding sequences have been described. Several studies showed that seven of the eight proteins involved in the polyalanine diseases form nuclear or cytoplasmic inclusions when overexpressed. These results suggest that the polyalanine proteins share a tendency to aggregate. To establish if this is a general property of proteins with polyalanine domains, we chose to study some that have not been implicated in diseases. We selected six transcription factors with variable size and position of the polyalanine domain in the protein: TBX2, ID4, BHLHB3, TLE3, PUM2 and ZNF358 and PHOX2B. Our results showed that five of the seven proteins tested form nuclear inclusions, while one formed cytoplasmic inclusions. Size and position of the polyalanine domain do not influence the aggregation properties. Co-expression studies with PABPN1 showed they do not co-aggregate. These results confirm the aggregative properties of proteins with polyalanine domains while suggesting that specific sites of nuclear aggregation do not exist.

P-073

Encephalitis lethargica: recent resurgence in Montréal

A Duquette (Montreal), D Black (Montreal), N Bergeron (Montreal), S Paradis (Longueuil), G Léger (Montreal)*

Background: Although diagnosed only rarely since the late nineteen thirties, sporadic cases of encephalitis lethargica with clinical characteristics reminiscent of those described by von Economo in 1917 continue to occur. *Methods:* We report two adult patients with a neuropsychiatric presentation of encephalitis. Clinical histories, laboratory findings, treatments and outcomes are described. Literature was reviewed. *Results:* Both patients presented with psychiatric features before developing catatonia. There were fluctuations in motor activity which alternated between profound catalepsy and agitation, as well as oculogyric crises. Lumbar puncture supported the diagnosis of encephalitis. CSF contained oligoclonal bands and elevated immunoglobulin G in one patient. Positive antistreptolysin-O antibodies were found in serum in the other patient, suggesting recent exposure to Group A streptococcus. All imaging studies including MRI, SPECT and FDOPA-PET were normal. The first patient benefited from treatment with L-DOPA and has had nearly complete remission at 2 years. The other is demonstrating a modest but clear improvement with electroconvulsive therapy. *Conclusion:* von Economo's encephalitis may still be observed. Since recent literature suggests an autoimmune etiology, it is important to include this condition in the differential diagnosis of encephalitis with neuropsychiatric features, especially in view of the possible benefit of early immunotherapy.

P-074

Using functional MRI to assess cortical function in comatose survivors of cardiac arrest

T Gofton (London), G Young (London), F Bihari (London), M Nicolle (London), D Lee (London), M Sharpe (London), S Mirsattari (London)*

Background: There are few reliable tools to assess cortical function in comatose patients following cardiac arrest. Blood oxygenation dependent (BOLD) functional MRI (fMRI) can non-invasively map brain function. The purpose of this study was to evaluate the role of fMRI in assessing cortical function and ultimately predict outcome in patients who present with coma following cardiac arrest. Methods: BOLD fMRI was used to map activation of the brain to checkerboard pattern response and tactile stimuli in three comatose patients following cardiac arrest. Within the first five days following cardaic arrest, fMRI data was correlated with electroencephalography. Data was also compared to Glasgow Outcome Score (GOS) at 3 months post cardiac arrest. Results: The first patient, a 52 year old woman, had no activation on fMRI and subsequently died with withdrawal of support. The second patient, a 17 year old man, had positive activation in the left parietal cortex to tactile stimulation of the right hand and in both occipital cortices to visual stimuli. The third patient, a 73 year old man, showed no activation on fMRI. The second and third patient both had a GOS of 3 at 3 months. Conclusion: FMRI could complement EEG in assessing cortical function. Its predictive value in assessing outcome of coma will require further studies.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-075

Production and Recognition of Gesture Errors in Limb Apraxia

V Stamenova (Toronto), S Black (Toronto), E Roy (Waterloo)*

The relationship between the ability to recognize and produce gestures errors in pantomime was examined in two stroke groups: patients with apraxia (n=39) or without (n=19). Apraxia was defined as a score of 2 SDs below the mean of the performance of 30 healthy age-matched control participants on pantomime of transitive gestures. Patients' performance was rated on one of three error types: posture, location and action. Subsequently patients were required to view videotaped performance of transitive gestures performed with one of these three errors and judge whether the gesture was performed correctly. A 2(apraxia) x 2(task) x 3(error type) analysis of performance accuracy revealed main effects of task ($p<.001$) (patients performed worse on gesture error recognition than on gesture production), error ($p<.001$) and apraxia ($p<.0001$). An interaction between apraxia and task ($p<.05$) showed that both groups showed low scores in gesture recognition, whereas the production scores were more impaired for the apraxia group. An interaction between apraxia and error and between task and error showed that the error differences are more likely among patients with apraxia and in gesture recognition rather than gesture production. These interactions suggest a dissociation between the production and conceptual praxis system.

P-076

Hyporesponsiveness in a 29-year old woman with a retro-auricular mass

L Segal (Montreal), A Walker (Montreal), E Marmor (Montreal), E Stern (Montreal), M Levental (Montreal), H Schipper (Montreal)*

Background: Major complications of aural cholesteatoma such as mastoiditis, meningitis, intracranial abscess, hydrocephalus and sigmoid sinus thrombosis are rare. *Methods:* We describe the case of a 29-year-old woman with a history of headache and dizziness that presents with an acute onset of loss of consciousness and a post auricular mass. *Results:* CT scan of the head showed a ring-enhancing lesion in the left cerebellum, causing obstructive hydrocephalus, mastoiditis with erosion through the temporal bone and destruction of the inner ear and sigmoid sinus thrombosis. Management included emergent tracheal intubation, intravenous antibiotics and mannitol, urgent neurosurgical evacuation of the abscess and total left mastiodectomy. Pathology showed a typical cholesteatoma. *Conclusions:* This is one of the few reports of complicated cholesteatoma presenting as acute obstructive hydrocephalus with rapid hyporesponsiveness in an adult. Our patient displayed a rare combination of a cerebellar abscess, complete erosion of the mastoid and inner ear, sigmoid sinus thrombosis, a post-auricular mass, complete paralysis of the ipsilateral facial nerve and resultant hearing loss. Although rare, superinfected cholesteatoma complicated by cerebellar abscess and acute obstructive hydrocephalus should be considered in the differential diagnosis of adult patients presenting with altered levels of consciousness and a postauricular mass.

P-077

Primary Amoebic Meningoencephalitis: a case report of successful treatment

R Schapiro (Montreal), R Del-Maestro (Montreal), L Durcan (Montreal), R Baskind (Montreal), M Guiot (Montreal), J Richardson (Montreal), Z Ali-Khan (Montreal)*

Background: Free-living amoebic CNS infections, 1st described in 1965, is a severe disease process, which is rapidly fatal. A case of Primary Amoebic Meningoencephalitis (PAM) caused by the *Naegleria* species is described here. There are only a handful of patients reported in the literature to survive PAM. Successful treatments all included Amphotericin B; one had a diagnostic and therapeutic craniotomy. We report the first stereotactically treated case of PAM. Timely neurosurgical intervention with the use of anti-microbial agents allowed this patient to survive and to eventually recover most of her neurological deficits. *Case Presentation:* A 43-year-old female presented to the emergency department with fever and headaches. A lumbar puncture revealed a pleomorphic leucocytosis without organismal growth. Despite broad-spectrum antimicrobials, the patient developed a rapidly progressive neurological deterioration with a hemiparesis and multiple lower cranial nerve deficits. MRI revealed a heterogeneously enhancing expansile lesion of the right cerebello-pontine angle with significant mass effect. The patient was brought to the OR for a frameless stereotactic biopsy. A thick and purulent discharge was evacuated with needle aspiration. Pathological investigations were consistent with the diagnosis of a *Naegleria*-like species. *Conclusion:* PAM, a rapidly progressive amoebic infection caused by *Naegleria* species, is usually fatal in less than 10 days. Intensive neurological observation with early neurosurgical intervention and anti-microbial treatment will offer the patient the best chance for survival and neurological recovery.

P-078

Consequences of Frontal Lobe Injury

N Chaudhary (Brampton)*

Background: Historically, the frontal lobes were considered "the seat of highest intelligence". In a seminal report, Hebb (1939) reported a patient with bilateral frontal lobe damage who made good psychological adjustment following frontal lobectomy. He concluded that intellectual defects do not inevitably follow frontal lobe damage. The objective of this paper is to review frontal lobe functions and the implications of injury to this region. *Methods:* A literature review of articles published in Medline and PubMed was conducted. Pertinent publications identified in the references of retrieved articles were included. *Results:* Kolb and Wishaw (1996) proposed a conceptual framework of 8 major symptoms of frontal lobe damage. Based on this framework, it can be asserted that the frontal lobes are involved in motor function, divergent thinking, internal control of behaviour, temporal memory, social behaviour, aspects of sexual behaviour, olfactory discrimination, and disorders associated with the facial area of the precentral gyrus. Specialized functions include: 1) motor function including fine movements, strength, movement programming, voluntary eye gaze, corollary discharge, and speech production; 2) divergent thinking includes spontaneity of behaviour

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

and strategy formation; 3) control of behaviour includes response inhibition, control in risky behaviour and following rules; and 4) temporal memory includes recency memory, frequency estimates, self-ordered recall, and delayed response. *Conclusion:* Kolb and Wishaw's framework is useful for understanding the functions of the frontal lobes, and predicting deficits following frontal lobe injury.

P-079

Obesity and Excessive Body Weight in Spina Bifida: An Observational Study in 176 Patients

A Singhal (Vancouver), P Thiessen (Vancouver), B Irwin (Vancouver)*

Background: It has long been recognized, by practitioners who regularly treat children with spina bifida, that excessive weight gain is a frequent and chronic issue amongst these patients. It is known that childhood obesity can predispose to a host of long-term cardiovascular, respiratory, musculoskeletal, and psychological issues, amongst other problems. To date, there have been few studies quantifying the magnitude of the problem of excessive weight or obesity in these children. The current observational study aims to quantify the frequency and extent of excessive weight and obesity in children with spina bifida. *Methods:* A retrospective study was conducted, analyzing 200 patients with spina bifida, who are followed in a multidisciplinary clinic at British Columbia Children's Hospital. Of these, 176 had adequate weight, length, and arm span measurements, allowing conclusions to be made regarding body habitus. Children were assigned to the overweight category if body mass index was greater than 85% for age and gender, and to the obese category if body mass index was greater than 95% for age and gender. *Results:* Of 176 patients, 108 (61.4%) were categorized as non-overweight, 41 (23.2%) were categorized as overweight, and 27 (15.3%) were categorized as obese. The range of body mass index seen was 12.74-37.76. Arm span tended to underestimate height, and subsequently body mass index. However, there was a strong correlation between arm span index (weight divided by arm span squared) and body mass index, suggesting that arm span might be useful in following body habitus in this patient population, in whom height determination can be difficult to perform due to spinal deformities and limb contracture. *Conclusions:* The rates of overweight and obesity, when adjusted for patient age and gender, were considerably higher in spina bifida patients than that reported in the general pediatric population. It is possible to follow these patients with objective measures of body habitus.

General Neurosurgery

P-080

Neuropsychological improvement following endoscopic third ventriculostomy for arrested hydrocephalus

P McDonald (Winnipeg), A Kilgour (Winnipeg)*

Background: Arrested hydrocephalus is a condition of ventricular enlargement without symptoms of raised intracranial pressure (ICP). Its incidence and natural history are unknown. It is felt that patients with arrested hydrocephalus may be prone to premature deterioration in cognitive function as they age. We hypothesized that patients with cognitive impairment and obstructive arrested hydrocephalus would benefit from CSF diversion by endoscopic third ventriculostomy (ETV). *Methods:* All patients referred with arrested hydrocephalus of an obstructive nature underwent neuropsychological testing. Patients with signs and symptoms of raised ICP were excluded from this study. Those with significant impairment on neuropsychological testing were offered ETV. Repeat neuropsychological testing was done 6 months post-ETV. *Results:* Between January 2004 and December 2005, 8 patients, ranging in age from 20-48 with obstructive hydrocephalus of an arrested nature were identified and underwent neuropsychological testing. 3 were found to have significant impairment of cognitive function and underwent ETV. 2 of the 3 had significant improvement in cognitive function at 6 month follow-up and 1 was unchanged. *Conclusions:* ETV can reverse cognitive impairment associated with arrested hydrocephalus of an obstructive nature. Further study is necessary to determine if these improvements are long-lasting and to determine appropriate selection criteria for ETV.

P-081

Anatomy of handedness: neurosurgical implications of a new understanding

I Derakhshan (Charleston)*

I present data of a patient who underwent deep brain stimulation for treatment of hand tremor. Stimulating the left thalamus obviated the tremor in both hands. Turning off the stimulator resulted in bilateral resumption of tremor. This will be shown graphically. Anatomy of handedness will be reviewed in light of a new understanding in directionality of callosal traffic underpinning neural handedness; which is discordant with the behavioral in no less than 20 percent of the population. Electrophysiological determination of neural handedness will be explained, providing for a noninvasive and inexpensive test to determine laterality of the major hemisphere in patients with tremor or epilepsy. It will be shown that seizures may start only in the major hemisphere (command center) unless the event in the minor hemisphere gives rise to raised intracranial pressure thus affecting the major hemisphere. This is based on the fact that signals trafficking between the two hemispheres are 1-way and are excitatory in nature.

Derakhshan I. Callosum and movement control; case reports. Neurological Research. 2003; 25:538-542; Derakhshan I. Crossed uncrossed differentials (CUDs) in a new light: Anatomy of the negative CUD in Poffenberger's paradigm. Acta Neurologica Scandinavica. 2006; 113: in press.

P-082

Dysautonomia resulting from superficial siderosis

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

Background: Superficial siderosis (SS) of the CNS is a rare disorder due to repeated subclinical subarachnoid hemorrhages. We report an unusual case who presented with dysautonomia secondary to a vagal nerve involvement. *Methods:* Case report and review of the literature. *Results:* A 23-year-old man presented 2 weeks after acute onset of a severe headache. Recently, the patient reported headache recurrence, transient aphasia, diplopia, vertigo, and urinary retention.

Cerebral MRI showed pathognomonic signs of SS including hemosiderine deposits on lower cranial nerves. During investigation, bilateral abducens and right facial nerves paresis were observed. Concurrently, the patient's systolic arterial pressure varied de novo between 120-150mmHg. The heart rate (HR) remained elevated between 110-130 beats\minute at rest with no identifiable factors. Cardiac work-up was normal. Angiography was negative. Spinal MRI was suggestive of cauda equina myxopapillary ependymoma. Histopathology examination confirmed the diagnosis and revealed focal deposits of hemosiderine from prior hemorrhages. Post-operatively, symptoms progressively improved. At discharge the HR returned to normal values. *Conclusion:* Acute dysautonomia, presenting as sustained tachycardia at rest, in the presence of multiple cranial nerve dysfunction, should evoke the possibility of SS. The recognition of this medical condition will lead to timely and appropriate investigations and treatment strategies.

P-083

Intracranial calcifying pseudoneoplasm

I Tarasiewicz (Montreal), F Berthelet (Montreal), M Bojanowski (Montreal)*

Background: Fibrocalcifying lesions are rare tumor-like calcified masses described in the entire neural axis. These tumors are thought to result of a benign non-neoplastic reactive proliferative process. They are slow growing lesions which share the same histopathology. We review the literature of intracranial calcifying pseudoneoplasms and add a case associated with partial callosal agenesis and midline lipoma. *Methods:* Case report and review of the literature. *Results:* Including our case, the series comprise 10 men and 2 women aged from 6 to 58 years old. The distribution can be intraparenchymal (7) or located at the cranial base (5). All reported intraparenchymally cases were not apparently attached to the meninges or choroid plexus. All the cranial base lesions were located in the posterior fossa. Two cases were associated with a corpus callosal lipoma. The main intraparenchymal lesion presenting symptom was seizure. Prolonged survival is the rule even after partial resection. *Conclusion:* Even though the pathogenesis is not well understood, calcifying pseudoneoplasms are thought to represent a non-neoplastic reactive proliferative process. In our case this process might have been triggered by a degenerative mesenchymal congenital complex including the lipoma. The recognition of this disease might avoid unnecessary and potentially dangerous management.

P-084

Onset of cervical pain in Lhermitte-Duclos disease (Dysplastic gangliocytoma) Case Report

F Maroun (St. John's), S Chiew (St. John's), R Avery (St. John's), G Mathieson (St. John's), J Barron (St. John's), N Hache (St. John's)*

Background: Lhermitte-Duclos disease (LDD) is an extremely rare posterior fossa lesion. The majority of the 106 reported cases were found in young adults. The most constant presenting feature is increased intracranial pressure. Chronic neck pain, as a presenting feature of LDD, has not been reported. *Methods:* A 71 year old man who presented with a six month history of neck pain increasing in severity. He was treated conservatively for cervical spondylosis with intermittent improvement. The only neurological finding at the time of admission was mild incoordination of his left arm. A large lesion in the cerebellum, both with cystic and solid components, with calcification was verified at surgery. Histologically the cerebellar lesion was a benign dysplastic gangliocytoma. *Results:* Postoperatively the neck pain disappeared and improvement continues in his cerebellar dysfunction. *Conclusions:* Neck pain without overt sign of increased intracranial pressure is an unusual presentation in LDD. Clinical, radiological, surgical and pathological features of the disease itself are reviewed.

P-085

Factors influencing the accuracy of neuroradiological diagnosis of intracranial mass lesions

C DeSilva (London), R Hammond (London), D Lee (London), A Leung (London), D Pelz (London), D Gorassini (London), J Megyesi (London)*

Background: Non-traumatic intracranial mass lesions are commonly faced by neurosurgeons and accurate diagnosis is key to guiding management. This study examined factors influencing the accuracy of neuroradiological diagnosis. *Methods:* Medical records of neurosurgical patients with non-traumatic intracranial mass lesions at London Health Sciences Center (LHSC) between 1998 and 2004 were reviewed and age, sex, type of imaging and final pathology diagnoses were tabulated along with clinical history. The neuroradiological and final pathology diagnoses were classified into seven diagnostic categories: high grade glioma (HGG), metastases (MET), meningioma (MEN), low grade glioma (LGG), lymphoproliferative disorder (LPD), abscess (ABS), reactive (REA), as well as other (OTH). Pre-operative neuroimaging films were read by neuroradiologists, once with clinical history and once without. A checklist was used to record the diagnosis, confidence level of the diagnosis and factors influential in making the diagnosis. *Results:* Clinical history had a limited but significant effect on sensitivity (77.9% vs. 69.8%, $p = 0.022$). This effect was strongest for metastases ($p = 0.012$). Overall, neuroimaging appears more sensitive for HGG, MET and MEN and less sensitive for LGG, LPD, ABS and REA. The level of confidence a neuroradiologist has in a diagnosis is strongly correlated with sensitivity ($p<0.001$). Analyses of factors influencing diagnosis showed anatomic location and enhancement were most important. *Conclusions:* Various factors contribute differently to the accuracy of the neuroradiological diagnosis of intracranial mass lesions.

P-086

Craniosynostosis involving the squamous temporal sutures: two cases of a rare (previously unreported) etiology for cranial vault asymmetry

Y Kalache (London), D Matic (London), M Lacey (London), K Hoogheim (London), A Ranger (London)*

Background: Surgical correction for craniosynostosis is undertaken for cosmetic purposes, as well as for increased intracranial pressure. We report two children who presented with squamous temporal suture synostosis. To date, there are no such cases reported in the medical literature. *Methods:* Two unrelated children

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

presented to our center with cranial vault asymmetry. One patient, a male, had isolated, non-syndromic right-sided fusion of the squamous temporal suture. A girl with Crouzon syndrome, which typically results in fusion of the coronal sutures, had bilateral lambdoidal and squamous temporal suture fusion. In both children, 3D-reformatted CT images demonstrated deformity of the temporal bones. Both patients underwent cranial reconstructive surgery by a multidisplinary team consisting of neurosurgery and plastic surgery. *Results:* At surgery, the squamous temporal sutures were fused with extensive bossing of the temporal bones in both cases. Bone flaps encompassing the fronto-temporal and temporo-parietal regions were elevated and remodeled. They were noted to have moderate-to-severe copperbeaten changes, consistent with localized raised intracranial pressure. Correction with an absorbable plate and screw fixation system was carried out. *Conclusion:* The craniosynostosis literature does not include a description of cranial vault changes associated with fusion of the squamous temporal sutures. Squamous temporal suture fusion may occur unilaterally and sporadically or in the setting of Crouzon syndrome and presents a distinctive cranial contour involving bossing of the temporal bone.

P-087

Vascular anomalies of the petrous face: aberrancy or anatomy?

D Warren (Vancouver), S Gul (Vancouver), R Yong (Vancouver), R Akagami (Vancouver)*

Background: We update a report on aberrant cerebellopontine (CP) angle vascular anatomy. Over a 3-year period we can report 6 cases of an intradural/intraosseous course of vessels supplying the brainstem and cerebellum. Recent publication on this anatomy suggests this is a rare phenomenon. *Methods:* A review of the English language literature is completed. A retrospective case series from this centre reveals 6 patients demonstrating various degrees of extra-arachnoidal vascular anatomy out of a population of 110 patients undergoing retrosigmoid craniotomy by one surgeon. Intraoperative photographs and/or video were obtained in these cases. *Results:* The literature on this variant potentially limits appreciation of significant surgical anatomy. We identify an incidence of 5.5 percent of patients with an aberrant vessel. Of these 6 cases: 3 were mobilized in a cuff of dura, 2 had an intraosseus course preventing mobilization, and 1 presented problems with significant intraoperative hemorrhage. *Conclusions:* In 6 cases an aberrant vascular pathway increased the technical difficulty. In 3 cases it limited the tumor exposure and resection. This rate of anatomic variance could be significant in choice of surgical approach and potential risks. These risks and theories regarding the origin are reviewed.

P-088

Pituitary Apoplexy: A case report and review of the literature

M Nikolakis (Edmonton), V Mehta (Edmonton), R Broad (Edmonton)*

Introduction: Pituitary apoplexy is a potentially life-threatening complication of pituitary adenomas. The classical presentation of pituitary apoplexy includes headache, nausea/vomiting, oculomotor palsies, visual field deficits, endocrinological disturbances and obtundation. We present two cases of apoplexy, highlighting the different presentations of this pathology. The literature was reviewed to determine the frequency of pituitary apoplexy in the diagnosis of pituitary adenomas, as well as the symptoms, possible predisposing factors, prognosis of visual and oculomotor deficits, and the surgical management of pituitary apoplexy. *Methods:* Both Medline and PubMed were searched with the MeSH terms “Pituitary Adenoma” AND “Apoplexy”. All relevant abstracts were reviewed and the most applicable articles were obtained for inclusion as references for this presentation. *Findings:* Pituitary apoplexy is a more common presentation in the diagnosis of pituitary adenomas than was once though. Case series report apoplexy as the initial presentation of 6.5% to 19% of newly diagnosed pituitary adenomas. The most common symptoms include headache (97%), followed by oculomotor palsies (82%) and nausea (80%). Visual field deficits occurred in 54.5%-71% of patients. Potential predisposing factors could be identified in 30% of patients, and included systemic anticoagulation, thrombolysis, recent surgery, hypertension, vaginal childbirth and discontinuation of bromocriptine therapy. Prognosis for the recovery of oculomotor palsies and visual field deficits was very good, with 71%-100% of patients experiencing resolution of their oculomotor palsy, and 81%-100% of patients experiencing resolution of their visual field deficits. Patients operated on within 8 days after the onset of clinical deterioration had a better prognosis than did patients operated on between days 9-34. *Conclusion:* Pituitary apoplexy is a more common presentation of pituitary adenomas than was once believed. Headache and oculomotor palsies are the most common presenting symptoms, and only 30% of patients will have a predisposing factor discovered on history. The prognosis for recovery of oculomotor palsy and visual field deficit is best with surgical decompression, particularly within 8 days of presentation

P-089

Cranioplasty Using Titanium Mesh

W Ng (London)*

Background: Finding the ideal substance to replace skull defects has remained a challenge. None of the commonly used cranioplastic materials including methyl methacrylate and absorbable alloplastic will ever surpass the properties of viable full-thickness autogeneic skull graft. However, the tendency of autogeneic bone cranioplasty to reabsorb can compromise the biomechanical properties and esthetic results. *Objective and Methods:* The purpose of this abstract is to report two cases of cranioplasty using titanium mesh. *Results:* The first patient was a 20-year old gentleman who sustained a compound comminuted fracture of both walls of the frontal air sinus after he was hit with a beer bottle. The second patient was a 45-yr old gentleman with skull invasion by a convexity meninigioma. The sizes of the skull defects were 8 cm X 8 cm and 8 cm X 9 cm respectively. The properties of the titanium mesh used include 1) easy application 2) strong but easily contoured 3) esthetically pleasing with no reabsorption 4) MRI-compatible. Follow-up was more than 4 months and 12 months respectively with no sign of infection and good patient satisfaction with cosmetic result. *Conclusions:* Titanium mesh can be used to replace skull defects with good biomechanical and cosmetic results.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-090

The No-Drill Technique of Anterior Clinoidectomy: A Skull Base Approach Tailored to Pathology

D Chang (Sacramento)*

Background: In published articles on anterior clinoidectomy, a power drilling technique is described to remove this skull base structure to optimizing neurosurgical exposure. However, there can be risk to neighboring neurovascular structures involving direct neurovascular injury and thermal injury to neurovascular structures, such as the carotid artery, optic nerve, and cavernous sinus. *Methods:* Retrospective chart review of the author's 40 consecutive cases of anterior cliniodectomy with and without resection of other skull base structures for a range of indications: tuberculum sellae meningiomas, clinoidal meningiomas, other lesions near the optic chiasm (sarcoid), selected ICA-posterior communicating artery aneurysms with relatively short ophthalmic segment of the ICA, selected ICA bifurcation aneurysms, large/giant anterior circulation aneurysms, ophthalmic segment aneurysms, cavernous sinus/pericavernous lesions, pituitary macroadenomas with suprasellar extension necessitating a transcranial approach, and basilar apex and SCA-PCA aneurysms approached via the tranSylvian approach. *Results:* A no-drill technique was employed in this surgical series. Strictly piecemeal removal with various bone-biting instruments was employed in all cases. Optimal microsurgical exposure was obtained in all cases. There were no incidences of direct injury to neurovascular structures. A wide microsurgical dissection of the Sylvian fissure supplemented the anterior clinoidectomy in many cases. A combination of approaches including pure extradural clinoidectomy and combined extradural and intradural removal were utilized. Illustrative cases are presented. *Conclusions:* A piecemeal anterior clinoid removal with bone-biting instruments of various sizes can be utilized in neurosurgical cases necessitating anterior clinoidectomy with and without resection of other skull base structures. If the Sylvian fissure is meticulously opened each time, there is adequate room in which to do the bony work intradurally; in some cases, the entirety of the anterior clinoid can be removed by an extradural approach. Rigorous study of preoperative CT scans, MRI, and angiogram is essential to identify the important anatomic relationships between the anterior clinoid process, the internal carotid artery and branches (ophthalmic artery), optic nerve, superior orbital fissure contents, and the cavernous sinus.

P-091

Epidermoid cysts of the fourth ventricle with extension through the foramina of Luschka: report of 3 cases

M Hebert-Blouin (Montreal), D Sirhan (Montreal)*

Background: Epidermoid cysts represent less than 2% of intracranial space-occupying lesions. Their localization in the fourth ventricle is unusual. Since 1974, less then 80 cases have been reported in the literature, without distinction between the cases developing exclusively in the fourth ventricle and those extending through the foramina of Luschka. *Methods:* From 1997 to 2005, 3 patients presented with an epidermoid cyst of the fourth ventricle extending through the foramina of Luschka. The presented patients and the literature review demonstrate how extension through the foramina of Luschka influences the presentation, the surgical approach and the extent of resection. *Results:* Our patients presented with more frequent cerebellar syndrome, cranial nerve palsy, and hydrocephalus than cases generally reported in the literature. A transtelovelar approach was used in all cases. Near total resection was achieved in our series, likely due to the extension into the foramina of Luschka. Follow-up (5months to 8 years) does not demonstrate significant evolution of the residual tumor. *Conclusion:* Epidermoid cysts of the fourth ventricle are rare and infrequently reported. A small minority may extend into the lateral apertures of the fourth ventricle. The cases reported here illustrate how this extension influences the presentation, the surgical approach and the extent of resection.

P-092

Adolf Meyer and "the peculiar detour of the ventral portion of the geniculo-calcarine path"

J Hall (Montreal)*

Nearly 100 years have passed since Adolf Meyer described the anatomic peculiarity of a portion of fibers making their way from the geniculate nucleus to the striate cortex by way of temporal lobe. This loop now bears his name. Over time many controversies have arisen regarding the precise localization of loop, the nature of the information conveyed and what deficit may result from damage to it. While Meyer's original conclusions were based on the study of patients with vascular and traumatic lesions, much has been added over the years by the careful documentation of patients undergoing temporal resections for intractable epilepsy. Penfield reported that temporal resections up to 6 cm from the pole do not result in a field defect; however, as our ability to detect subtle visual field losses increases, many authors are suggesting a more anterior position of this pathway. Meyer's Loop purportedly carries homologous information from both inferior retina to the inferior bank of the calcarine sulcus. This has been based on the repeated observation of a congruous superior quadrantanopsia which results following interruption of these fibers. Others have found that the deficit is incongruous and may extend below the horizontal meridian with the implication of an asymmetric retinal contribution of more than an exact quadrant. More recent imaging studies (MR tractography) and surveillance of patients undergoing tailored temporal resections for epilepsy are continuing to elucidate these controversies. This presentation will review the pertinent literature and discuss how we may further our understanding of this anatomic curiosity

P-093

Endoscopic third ventriculostomy in adult patients: Quebec city's experience

G Lapointe (Quebec City), D Lacerte (Quebec City), A Turmel (Quebec City)*

Objective: To study the efficiency and complications of endoscopic third ventriculostomy(ETV) in adults. *Method:* The charts of the patients who presented with obstructive hydrocephalus and who underwent an ETV since 1998 were reviewed. We analysed the rate of success of the surgery by observing the resolution of the symptoms and the diminution of ventricular size. We also evaluated the occurrence of complications. *Results:* More than 30 patients underwent an ETV between 1998 and 2005. The main surgical

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

indication was acqueductal stenosis. 1/3 of our patients also had simultaneous biopsy of an intraventricular lesion. We also performed ETV on one patient with hydrocephalus and Chiari I malformation and on another patient with Chiari II malformation. Most of our patients underwent surgery without complications but some experienced persisting Parinaud's syndrome and a slow resolution of their symptoms. A case of CSF fistula was observed. 2 cases of failure were seen. One patient died from hydocephalus a week after having ETV and a biopsy for a pineal yolk sac tumor. *Conclusion:* We consider that ETV is a valuable treatment of obstructive hydrocephalus in adults. Complications may occur and one should be careful when performing a simultaneous biopsy.

P-094

Complete upward migration of the peritoneal end of a ventriculo-peritoneal shunt into the subgaleal space - A case report

A Singhal (Vancouver), P Gan (Vancouver)*

Background: Shunt complications unfortunately remain quite common, in particular shunt blockage, disconnection or fracture. Complete upward migration of the peritoneal end of a ventriculo-peritoneal (VP) shunt into the subgaleal space, however, is very rare with few reported cases in literature. *Methods:* Case report of a child with upward migration of the peritoneal end of a ventriculo-peritoneal shunt. *Results:* We present a 7-month old child who suffered a Grade II intraventricular hemorrhage shortly after birth. The child had a ventriculo-subgaleal shunt in place, which was subsequently converted to a VP shunt. The child subsequently presented with irritability and a progressive subgaleal fluid collection. Plain radiographs of the head demonstrated the entire distal catheter had migrated up into the subgaleal space. Two main hypotheses were made concerning the cause of this, the 'negative pressure' effect and the 'windlass' effect which was postulated to be the most likely hypothesis. *Conclusions:* Upward migration of a VP shunt is a rare complication, and might be prevented by securing the reservoir and peritoneal catheters in place.

P-095

Analysis Of Surgical Failures for Hemifacial Spams at Re-Operation

A Kaufmann (Winnipeg), M Wilkinson (Winnipeg), J Nesbitt (Winnipeg)*

Introduction: Hemifacial Spasm (HFS) is a manifestation of facial nerve (FN) system hyperactivity caused by neurovascular compression (NVC). We achieve cure in 85-90% with microvascular decompression (MVD), and here examine failures of this surgery.

Methods: Analysis of operative findings and outcomes was conducted for our patients undergoing "redo-MVD" for HFS.

Results: Two groups of patients were identified: i) among our 126 undergoing MVD for HFS, 10 required redo MVD. No new NVC culprits were discovered. In 7 cases, the ectatic vertebral artery (5) or AICA loop (2) had shifted since the first surgery and could be more thoroughly mobilized using special MVD techniques with excellent results. The other 3 patients had no NVC and failed to improve; ii) six patients had prior MVD elsewhere, and were all found to have typical NVC that had not been identified or elevated at the prior surgery. Redo MVD provided excellent results in 5. Another had severe scarring related to the old implant material that hindered decompression attempts, resulting in persisting spasms, further hearing loss and a partial facial palsy. *Conclusions:* The success of MVD for HFS is dependent upon the adequacy of FN decompression, and cure should be achieved in the vast majority of patients. Failure to cure is only rarely (3/126) due to irreversible FN hyperactivity.

Movement Disorders

P-097

Parkinsonism presenting in an adult patient with Joubert's Syndrome: a PET study

A Alshehri (Vancouver), S Gunzler (Portland), J Nutt (Portland), A Stoessl (Vancouver)*

Background: Joubert's syndrome (JS) is a congenital disorder characterized by respiratory abnormalities, motor delay, mental retardation, hypotonia, eye movement abnormalities, ataxia, and total or partial aplasia of the cerebellar vermis. It generally presents within the first few years of life. Parkinsonism has not previously been reported in JS to our knowledge. *Methods:* We report dopamine imaging findings in a 48-year-old male with longstanding ataxia, eye movement abnormalities, motor delay, and cognitive impairment. He presented with seven months of subacute onset hypophonia, masked facies, rest tremor, impaired rapid repetitive movements, and an ataxic and shuffling gait, a presentation suggestive of Parkinsonism as well as ataxia. There was no response to Levodopa / Carbidopa. *Results:* Fluorodopa PET revealed normal uptake in both caudate and putamen. [^{11}C]raclopride binding was significantly increased for age, compared to controls. MRI revealed vermian aplasia, but the basal ganglia were normal. *Discussion*: Normal fluorodopa uptake suggests that the nigrostriatal dopamine projections are intact. However, the increase in raclopride binding is compatible with reduced synaptic levels of dopamine. This could reflect impaired dopamine synthesis, or release, or increased reuptake/catabolism. Parkinsonism could also be explained by abnormal striatal outflow, but there was no evidence for this on structural imaging.

P-098

Neurosurgical Treatment of Intractable Tourette's syndrome: A scientific clinical review of literatures

M Meratee (Los Angeles), J Chung (Los Angeles), J Schweitzer (Los Angeles)*

Background: Tourette's syndrome is an inherited neuropsychiatric disorder characterized by motor and vocal tics that starts in childhood. Pharmacotherapy has been the mainstay of the treatment. However, some TS patients will not respond to conventional medications. They might develop residual debilitating symptoms. The current article examines the reported experience with neurosurgical treatment of intractable Tourette's syndrome. *Design/Method:* All articles and textbooks containing descriptions of Tourette's syndrome and its surgical treatment were reviewed. All related articles in PubMed were searched using these words: Tourette's syndrome, TS, Tourette, Gilles de la Tourette, tic, tics,

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

surgical treatment of tic disorders, surgical intervention of Tourrete's syndrome, ablative surgery in Tourette's syndrome, stereotactic surgery of Tourette's syndrome. Only articles published in English were reviewed. All data about patient's history, surgical treatment, outcome and side effects were collected and reviewed. *Results:*A variety of experimental procedures have been performed in an attempt to treat intractable Tourette's syndrome, including: 1) frontal lobe operation (i.e., frontal lobotomy and bimedial frontal leucotomy), 2) Limbic system operation (i.e., anterior cingulotomy, limbic leucotomy), 3) a novel multisite operation(i.e., anterior cingulotomy combined with infrathalamic lesions), 4) Thalamic operation (i.e., bilateral coagulation of rostral infrathalamic and medial thalamic nuclei), and 5) a cerebellar operation (i.e., bilateral cerebellar dentatomy). There are serious uncertainties regarding any experimental neurosurgical procedures. However, in the case of severe, intractable Tourette's syndrome, these appropriate concerns must be weighed against the risks of conventional therapies, including tardive dyskinesia. *Conclusion:* Case reports in the literatures provide only anecdotal evidence supporting the efficacy and safety of neurosurgical treatment of Tourette's syndrome. There is no convincing evidence showing that any particular neurosurgical procedure is best for Touretts's syndrome. If experimental neurosurgery for Tourette's syndrome is to continue, then guidelines should be developed regarding patient and operation selection. Also, accurate clinical measurement should be applied preoperatively and postoperatively to monitor log-term outcome.

P-100

Complex Motor Stereotypies: Evidence for Autosomal Dominant Inheritance

J Lauzon (Calgary), E Wirrell (Calgary), O Suchowersky (Calgary)*

Objective: To document the features of stereotypy in a large three generation pedigree. *Background:* Stereotypies are defined as repetitive, rhythmic patterned movements. Many studies have described the presence of stereotypies in individuals with neurological and psychiatric disorders such as autism, Rett syndrome, and schizophrenia. However, little is known about similar complex motor stereotypies in normal healthy individuals. *Method:* Family history was obtained and family members were examined. Blood was collected for genetic studies. *Results:* The proband, an 8 year-old boy, had been noted to have daily episodes of repetitive hand flapping, posturing, facial grimacing and pacing most prominent with fatigue and illness. The father had identical episodes as did the paternal grandfather, aunt and younger brother. Older individuals were able to suppress these episodes and they did not interfere with quality of life. Affected individuals were asymptomatic between episodes. Neurological examination of family members was normal. The pedigree was consistent with autosomal dominant inheritance. *Conclusion:* To the best of our knowledge, this is the first description of complex motor stereotypies inherited in an autosomal dominant fashion. The description of this and other families will provide us with information for gene mapping studies and provide insights into the pathophysiology of complex motor stereotypies.

P-101

Auto-immune Thyroid Disease and Segmental Myoclonus

B Young (London), J Wojcik (London), A Driedger (London)*

Background: We report a case of segmental myoclonic movements involving the abdominal and paraspinal muscles in association with an autoimmune thyroid disease. Only one case of "truncal flexion" had been previously noted with Graves' disease. *Case Report:* a 38 year old Caucasian male developed clinical hyperthyroidism with increased T3, free T4, anti-thryroglobulin antibodies and antiperoxidase antibodies and deceased TSH. Antinuclear antibodies were moderately positive, with a homogenous speckled pattern. Several days after radioiodine treatment he developed bilaterally synchronous twitches involving abdominal and lower paraspinal muscles. The intensity of the myoclonus roughly correlated with both elevated free T4 and T3 values and anti-thyroid antibodies. Clonazepam, valproate and prednisone were ineffective. The myoclonus markedly diminished spontaneously after about 2 months, with improvement in thyroid and immunological markers. *Conclusions:* In our patient segmental lower abdominal and truncal myoclonus was associated with autoimmune thyroid disease, worsening with both the degree of hyperthyroidism and the immunological status. The mechanism remains to be determined.

P-102

Limb myokymia associated with minor central cord syndrome

M Ziller (Sherbrooke), M Arsenault (Sherbrooke), F Evoy (Sherbrooke)*

Background: Myokymia refers to the clinical phenomenon of continuous undulating movements of muscles. Most common etiologies include multiple sclerosis, Guillain-Barré syndrome, radiation plexopathy and pontine tumors. Myokymia in limb muscles has been described with syringomyelia. *Methods:* A case report is presented. *Results:* A 41 year old woman presented with a 4 month history of cervicalgia and paresthesias irradiating to both arms after whiplash injury. She had a previous history of degenerative cervical spine disease. Examination showed vermiform movements in both thenar eminences and right first dorsal interosseous. Slight bilateral weakness of thumb abduction was present. Nerve conduction studies were normal. Electromyography revealed myokymic discharges characterized by brief bursts of single motor unit potentials firing at rate of 5-150 Hz. They were observed in right first dorsal interosseous and both abductor pollicis brevis, corresponding to a bilateral C8-T1 distribution. Magnetic resonance imaging of the cervical spine confirmed stable non-compressive cervical disc herniation at C5-6 and C6-7. No intramedullary abnormality was seen. *Conclusion:* A minor traumatic central cord syndrome in the setting of degenerative disc disease is the most likely etiology for limb myokymia in this patient. To our knowledge no other similar cases have been reported in the literature.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-103

Neurophysiological Characterization in Asymptomatic Relatives of SCA2 Patients. A Seventen Years Prospective Follow up Study.

L Velazquez (Holguin), G Sanchez (Holguin), N Canales (Holguin), J Rodriguez (Holguin)*

Background: SCA2 has a prevalence of 42 per 100 000 inhabitants in Holguín province, which is the highest one reported worldwide. *Methods:* We investigated fifty five non- symptomatic first-degree relatives of SCA2 patients. They were studied 5 times over a period of 17 years by motor and sensitive nerve conduction studies and multimodal evoked potentials. *Results:* The most consistent findings were the reduction in amplitude or absent in sensitive potentials and the increase in absolute latency of P40 component. Our data shown the structures of the nervous system are involved before any clinical symptom and/or sign appear. This allows us defining four stages in the evolution of this disease: First stage: normal electrophysiological parameters. Second stage: decrease in the amplitude of the sensitive potentials, increase in the absolute and interpeak latencies in the SSEPs, and abnormal morphology in the BSAEPs. Third stage: increase electrophysiological abnormalities, which correspond with the first clinical manifestation of the disease and fourth stage: both peripheral and central afferent conduction blocks appear, expressed by absence of the response in sensory conduction nerve studies and in SSEPs. *Conclusions:* This classification of the disease in different stages allows knowing the degenerative process during the evolution of the disease of the afferent and efferent systems. Also, the existence of electrophysiological abnormalities in non-symptomatic subjects permits to choose the optimal moment for the evaluation of a specific therapeutic action in the SCA2.

P-104

Sympathetic Skin Response and Heart Rate Variability in Patients with Spinocerebellar Ataxia Type 2

G Sanchez-Cruz (Holguin), L Velazquez-Perez (Holguin), L Almaguer-Mederos (Holguin), J Rodriguez-Diaz (Holguin), N Canales-Ochoa (Holguin), R Tejeda (Holguin)*

Background: Somatic Nervous System in Spinocerebellar Ataxia Type 2 has been very well studied to date but not from the point of view of the Autonomic Nervous System. *Methods:* Sympathetic Skin Response (SSR) and the Heart Rate Variability (HRV) at rest, during the Deep Breathing and Tilt Table Test were examined in 103 patients with SCA2 and 103 controls, correlating them according to disease duration, polyglutamine size, and other parameters. *Results:* The SSR latencies in patients (mean palm, 1504.805±204.89 milliseconds; mean sole, 2174.93±489.10 milliseconds) were prolonged compared to controls (mean palm, 1482.60±157.43 milliseconds [P=0.459689]); mean sole, 2020.82±269.75; milliseconds [P=0.019000]) and amplitudes in patients (mean palm, 185.1±160.7 μV; mean sole, 100.0±97.1μV) were smaller compared to controls (mean palm, 276.3±187.2 μV [P=0.001628]; mean sole, 154.4± 1,21 μV [P=0.003033]). Overall, patients showed lower HRV indices than controls (p<0.005). Multivariate analysis showed a significant effect on time evolution, the high frequency power (F=4.46, p=0.001) and the coefficient of variation (F=4.83, p=0.003), indicating a significant reduction in vagal modulation of the patients. There was a shift in autonomic neurocardiac balance towards sympathetic predominance in the SCA2 group compared with controls (F=2.59, p=0.068). Besides, an inverse correlation was found between the time evolution and the modulation of cardiovagal activity (p=0.008), but not with the polyglutamine expansion size. *Conclusions:* These results indicate that there is autonomic dysfunction in patients with SCA 2 that affects both the sympathetic and parasympathetic branch of the autonomic nervous system. An influence of the time of evolution on these alterations was also shown.

P-105

Parkinsonism as a manifestation of systemic lupus erythematosus

D Orta (Mexico City), J Macìas* (Mexico City)*

Introduction: The affect on the central nervous system by systemic lupus erythematosus (SLE) is well established and frequency goes from 14 to 75%. Alterations of movement appear in 4% and are considered rare manifestations of SLE, being the most frequently chorea. Parkinsonism as manifestation of lupus is extremely rare. *Objective:* To report one case of parkinsonism associated with SLE in the National Institute of Neurology and Neurosurgery in Mexico City. *Results:* Case 1: 45 yo woman. In June 2005 she started with rest tremor of left arm, hypokinesia, hypomimia, bradykinesia, language hypokynetic, rigidity and festinant gait. Fixed malar erythema, and photosensitivity. Brain MRI with infarction due to vasculitis in substantia nigra right. Antinuclear antibodies 1:320. Therapy: Pramipexole and Carbidopa/Levodopa observing partial response *Conclusions:* We report the first case to our knowledge of a strategic infarct of the right substance nigra with parkinsonism contralateral associated with SLE in a Mexican patient. The etiology of the parkinsonism associated with rheumatic diseases is not understood completely, nevertheless it has been postulated that antibodies against the dopaminergic neurons and the vasculophaty immune are probably mechanisms of injury.

P-106

Effects of Heme Oxygenase-1 on Wild-Type and Mutant (A30P) alpha-Synuclein Expression in Human Neuroblastoma Cells

A Patel (Montreal), W Song* (Montreal), H Paudel (Montreal), H Schipper (Montreal)*

Introduction: α-Synuclein is a major protein constituent of neuronal Lewy bodies (LB) in Parkinson disease (PD). Astroglial over-expression of the heme-degrading enzyme, heme oxygenase-1 (HO-1) in the PD substantia nigra promotes mitochondrial iron sequestration and may sensitize dopaminergic neurons to oxidative injury (Schipper, 2004). Here we evaluate the effects of HO-1 on wild-type (WT) and mutant (A30P) α-synuclein expression in human neuroblastoma (M17) cells. *Methods:* The effects of transient hHO-1 transfection on levels of endogenous or co-transfected α-synuclein (WT or A30P) were measured by Western blot in M17 cells in the presence or absence of the HO and proteasome inhibitors, SnMP and lactacystin, respectively. Deferoxamine and bilirubin were administered to sister cultures to delineate the role(s) of iron and bilirubin (heme breakdown products) on altered α-synuclein

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

metabolism. *Results:* hHO-1 transfection significantly decreased endogenous and transgenic WT α-synuclein levels, effects reversed by SnMP, lactacystin or deferoxamine (but not bilirubin). hHO-1 transfection, deferoxamine and bilirubin had no effects on A30P levels. *Conclusions:* Iron liberated by HO-1 over-expression may induce proteasomal degradation of WT α-synuclein, and thereby promote synaptic dysfunction. Conversely, failure of HO-1 to suppress mutant α-synuclein and its putative toxic gain of function may predispose to familial PD.
* Equal contribution to this study

P-107

Movies and movement disorder patient medical records

S Akhtar (Saskatoon), A Rajput (Saskatoon), A Rajput (Saskatoon)*

Objective: To determine the importance of video documentation in Movement Disorders. *Background*: Detailed patient records are a major objective of good medical practice. Movies augment written records that are often incomplete, due to the complexity of cases. Most movement disorder experts make movies of "unusual" and "interesting" cases. Some patients deemed to be of no interest, may turn out to have clinical and scientific value. We rely heavily on movies as a method of record keeping in our practice and research. *Method:* Since 1969, we have made movies on consenting patients. A mini digital video camera is available at every clinic and the nurses are responsible for making the movies. There is no fixed protocol. Effort is made to highlight the main clinical features of the given patients. *Results:* Movies archived to date include: 1210 Parkinson Syndrome, 390 Essential Tremor and 177 other movement disorder cases. 241 cases had repeated movies to document certain issues of interest. 345 of the cases had autopsy done. Selected movies will be presented to highlight their importance. *Conclusion:* Movies have enhanced our record keeping and scientific publications on Movement Disorders remarkably. Efforts should be made for greater use of movies without violating patient privacy.

P-108

Unexpected benefit of propofol in stiff-person syndrome

E Hattan (Montreal), M Angle (Montreal), C Chalk (Montreal)*

Background: Stiff person syndrome (SPS) is a rare autoimmune disorder characterized by muscular rigidity with superimposed painful spasms. Treatments include immunomodulating therapies and drugs that enhance GABAergic neurotransmission. Unfortunately, these treatments may lose efficacy and alternative treatments are limited, particularly for severe SPS. *Methods:* A 70 year-old woman presented with episodic involuntary leg extension. Her GAD antibody titre was 71.2 (normal<1) and the stiff-limb variant of SPS was diagnosed. Diazepam (4-6 mg daily) rendered her symptom-free for the next 4 years. In July 2005 she abruptly developed severe continuous leg spasms, resulting in rhabdomyolysis (CK~6000). In hospital, she was given trials of high dose benzodiazepines, baclofen, corticosteroids, levetiracetam, intravenous immunoglobulin, and intravenous ethanol, none of which produced improvement. When intravenous propofol was introduced, however, symptoms abated. *Results:* Intravenous propofol (15-30mcg/kg boluses) produced immediate relief of spasms. Spasms reappeared 2-3 hours after each dose and ceased when propofol infusion was resumed (10mcg/kg/min). The efficacious dose did not impair mental or respiratory function. After 30 days, propofol was replaced with an intrathecal baclofen pump. *Conclusion:* We found propofol to be an effective short-term treatment for refractory SPS. Propofol may be a useful addition to current interventions for severe SPS.

P-109

Persistent suppression of hyperkinetic symptoms after a limited course of deep brain stimulation in two patients

M Hebb (Halifax), P Chiasson (Halifax), I Mendez (Halifax)*

Background: The physiological sequelae of deep brain stimulation (DBS) are not understood. Recurrence of DBS-responsive motor symptomatology typically occurs with discontinuation of therapy. We report the persistent abolition of debilitating hyperkinetic movements in 2 patients treated with DBS. *Methods:* Patient #1 suffers from Cockayne syndrome, with progressive, intractable dyskinesias since the age of 12 years. He was treated with left thalamic DBS, performed 5 years ago at age 17 years. Patient #2 had a 10-year history of choreathetoid and dystonic movements of unknown etiology. She received bilateral pallidal DBS at age 57 years and is now 5 years since the procedure. *Results:* Both patients had a rapid and dramatic reduction in movements with the DBS. Patient #1 had a progressive decline in motor symptoms bilaterally and was found to be DBS-independent after 4 years. He is now more than 1 year since cessation of therapy, without return of symptoms. Patient #2 initially remained symptomatic with the DBS off and required a unilateral generator replacement at 4 years. In the subsequent year, the second generator expired, without return of symptoms. She was successfully trialed with both DBS systems deactivated and has remained DBS-independent for 6 months. *Conclusions:* DBS may exert longstanding, functional effects in the brain, despite the theroretical reversibility of this therapy. Certain patients may require only limited courses of DBS to maintain motor control. Further investigations into the molecular and physiological consequences of DBS in neural systems are warranted.

P-110

Dopaminergic neurons intrinsic to human striatum in Parkinson's and Huntington's diseases

P Huot (Quebec), M Lévesque (Quebec), A Parent (Quebec)*

Background: The striatum harbors a population of dopamine (DA)-containing neurons that increases in number in animal models of Parkinson's disease (PD). These cells could locally produce DA to compensate for the reduction of striatal DA that characterizes PD. The fate of these neurons in idiopathic PD and in Huntington's disease (HD) is unknown. *Methods:* We used antibodies against the enzyme tyrosine hydroxylase, a marker of DA cells, combined with propidium iodide nuclear staining, to compare the number of striatal DA neurons in normal, PD, and HD brains. *Results:* In contrast to animal studies, the number of striatal DA neurons in PD was significantly ($p < 0.05$) reduced. This reduction could result from L-dopa treatment, which compensates for the loss of DA. The number of DA neurons was also reduced in HD, a pathology in which striatal DA concentration increases. We hypothesize that the number of striatal DA neurons is inversely related to the amount of striatal DA, which appears to exert a negative feedback on the expression of this

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

cell population. *Conclusions:* Intrinsic striatal DA neurons, whose number appears to be regulated by local DA concentration, could play a crucial role in striatal DA homeostasis, in both health and diseases.

P-111

Gait and balance impairment is associated with mentation, mood and behavior in early Parkinson's disease

A Rajput (Saskatoon), M Rajput (Saskatoon), L Klassen (Saskatoon), L Ferguson (Saskatoon)*

Background: Parkinson's disease (PD) causes gait and balance impairment and changes in mental health. This study sought to identify interrelationships between these two areas. *Methods:* Patients with early PD [Hoehn & Yahr (H&Y) stage 1 or 2] were recruited. A neurologist rated them with the Unified Parkinson's Disease Rating Scale (UPDRS). A physiotherapist assessed gait and balance with six tools: the Emory functional ambulation profile, functional reach, 2 minute walk velocity, Human Ambulation Profile (HAP), postural stress test, and activities-specific balance confidence scale. Patients were grouped according to UPDRS Part I (mentation, behavior, and mood sub-score): 0, 1, or ≥2. *Results:* Twenty-one patients were recruited (15 male, 6 female, average age 68 years). Most were H&Y stage 2 (n=19). UPDRS Part I score was 0 (n=9, 43%), 1 (n=6, 29%), and ≥2 (n=6, 29%). Median UPDRS Part II (ADL) score was 8 (range 1-17). Median UPDRS Part III (motor) score was 15 (range 4-27). UPDRS Part I was not correlated to motor or ADL scores. In univariate analysis, UPDRS Part I was significantly associated with the gait and balance assessments. In multivariate analysis, UPDRS Part I was associated with the adjusted ambulation score of HAP and no other variables improved the model. *Conclusions:* Mood, mentation, and behavior, as measured by UPDRS Part I, is highly associated with measurements of gait and balance impairment. Improving PD patients' mental health may lead to improvements in motor abilities.

P-112

The Applause Sign in Huntington's Disease

S Reid (Calgary), O Suchowersky (Calgary)*

Introduction: The applause sign is a simple test of motor control . It is present when a patient shows an inability to properly suppress an automatic program of applause when asked to initiate a voluntary program of three claps. It has recently been shown to discriminate Progressive Supranuclear Palsy(PSP) from Parkinson's Disease(PD) and Frontotemporal Dementia(FTD). It has thus been proposed to be a relatively specific characteristic of PSP; possibly attributable to combined frontal and striatal dysfunction.
Huntington's disease(HD) comprises a primarily subcortical degenerative process. Similarly with PSP, the cognitive deficits in HD result from pathological changes at multiple sites in the frontostriatal circuitry. Such dysfunction would predict the presence of the applause sign in HD. *Methods:* Forty patients(20 with HD and 20 with PD) were examined for the presence of the applause sign. Mini-mental Status Exam (MMSE) and Frontal Assessment Battery(FAB) scores and disease duration were recorded. *Results and Conclusion:* The applause sign was absent in all PD patients. Four of 20(20%) HD patients showed the applause sign. No relation was seen with duration of disease, MMSE or FAB score. These results suggest that the applause sign is not unique to PSP, and may be a common finding in conditions with frontostriatal degeneration.

P-113

The use of bilateral pallidal deep brain stimulation for the treatment of idiopathic craniofacial dystonia

G Marchuk (Winnipeg), M Wilkinson (Winnipeg), J Krcek (Winnipeg)*

Background: Meige syndrome is an idiopathic adult-onset focal dystonia characterized by blepharospasm and oromandibular dystonia. Recently, pallidal deep brain stimulation (DBS) has been advocated for patients with generalized dystonia, although its use in focal dystonic disorders has not been widely reported. We report the first Canadian case of a patient with isolated Meige syndrome treated successfully with bilateral pallidal DBS. *Methods:* A 62-year-old woman with idiopathic Meige syndrome presented with functionally debilitating blepharospasms, oromandibular dystonias and painful platysmal contractions refractory to medical management. She underwent microelectrode pallidal mapping and placement of bilateral DBS electrodes. Her response to DBS was assessed by means of standardized rating scales as well as pre- and post-operative video analyses. *Results:* Placement of pallidal DBS electrodes resulted in immediate relief of all symptoms. Follow up at six months confirmed a persistent marked benefit from DBS, as documented by blinded video analysis and substantial improvement in rating scale scores. The patient reported a one hundred percent improvement in her quality of life. There were no complications. *Conclusions:* Bilateral pallidal DBS is effective in the management of idiopathic isolated craniofacial dystonia. It should be considered as a therapeutic option in those patients with disabling symptoms who are refractory to medical therapy.

P-114

Evaluation of balance status in early stage Parkinson's disease

L Klassen (Saskatoon), A Rajput (Saskatoon), M Rajput (Saskatoon)*

Background: The study evaluated the reliability of the Postural Stress Test (PST) and compared scores for the PST, the pull test (from Unified Parkinson's Disease Rating Scale) and the Functional Reach test (FR). The PST uses a pulley system to apply backward perturbations at 1.5, 3 and 4.5% body weight. Responses are rated 0-9. The FR measures forward reach. *Methods:* Individuals with early PD were evaluated by a neurologist (pull test) and a physical therapist (PST and FR). Test scores were compared using Chi-square and ANOVA. PST reliability was analyzed, from digital images, using ICC. *Results:* Twenty-one participants (average age 68) were recruited. Nineteen were Hoehn & Yahr stage 2. Nineteen had pull test scores of 0. PST scores (modes) at 1.5, 3 and 4.5% were 8, 6 and 6 respectively. The mean FR score was 30.2 + 5.6 cm. PST intra-rater ICC scores for 1.5, 3 and 4.5 % body weight were .91, .24, and .69 respectively. PST inter-rater scores were .94, 1 and .88. There was no association between the pull test and the PST. Associations between FR and PST at 3 and 4.5% body weight were significant. *Conclusions:* PST scores at 1.5 and 4.5% body weight demonstrate

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

satisfactory reliability. Modification of the rating scale to improve reliability is proposed. Despite opposite directions of perturbation, PST and FR balance scores are associated.

P-115

Cognitive task induced gait changes in young healthy adults

N Nadkarni (Toronto), Z Karl (Toronto), M William (Toronto), S Black (Toronto)*

Background: Changes in gait could be triggered by the performance of verbal working memory (vWM) and covert spatial attention (cSA) cognitive tasks while walking due to capacity-sharing of common frontal-subcortical brain regions. We examined gait changes in young adults (30 years) induced by the vWM and cSA tasks while walking. *Methods:* Gait velocity, cadence and double-support time, were measured on an automated walkway both in isolation and during concomitant performance of vWM and cSA tasks using computerized paradigms, which were displayed on the screen across the walkway. Reaction times (RT) were captured using a hand-held device. *Results:* Gait velocity and cadence decreased ($p<0.01$) with vWM (105±14m/s and 99±11 steps/min respectively) and cSA (110±16m/s and 102±11 steps/min respectively) tasks as compared to regular walking (122±14m/s and 107±8 steps/min respectively). Double-support time increased ($p<0.05$) with vWM (0.33±0.05 sec.) and cSA (0.31±0.06 sec.) tasks compared to regular walking (0.28±03 sec.). All parameters except double-support time had greater differences ($p<0.05$) during vWM task as compared to cSA task performance. RT were similar in all conditions. *Conclusion:* In young adults, concomitant performance of specific cognitive tasks while walking induces changes in gait patterns. The extent of cognitive-task induced gait changes may depend on the task-complexity.

Multiple Sclerosis

P-116

Does smoke reveal fire? - A systematic review of smoking and the risk of multiple sclerosis

A Poppe (Montreal), C Wolfson (Montreal)*

Background: Multiple environmental and infectious exposures have been implicated as risk factors for multiple sclerosis (MS), though most of these are not realistically modifiable. Identifying modifiable risk factors would contribute to primary prevention strategies. Cigarette smoking has been proposed to be one such risk factor. *Methods:* We conducted a systematic review of all English and French language studies published between 1985 and 2005 addressing cigarette smoking as a risk factor for MS, as identified through MEDLINE, EMBASE and bibliographic review. Six studies were identified: two case-control studies (one nested case-control), three cohort studies, and one cross-sectional population study. *Results:* The studies are of varying quality, but all suggest a modest association between smoking and MS. A statistically significant association was found in 4 studies. The differences in methodologies did not permit a statistical pooling of data. Limited evidence also links smoking with worsening MS motor deficits and progression of relapsing-remitting disease to a secondary progressive form. *Conclusions:* All studies suggest a modest association between cigarette smoking and the risk of developing MS. Although several pathogenic mechanisms are proposed, all remain speculative. There are currently inadequate data concerning quantity smoked, duration and age at onset of smoking as modifiers of this association. Nevertheless, smoking is one of the rare risk factors for MS that is readily modifiable, and therefore an ideal target for possible reduction of future MS burden.

P-117

Health status of persons with multiple sclerosis (MS) in the Canadian community-dwelling population

S Warren (Edmonton), K Warren (Edmonton), S Pohar (Edmonton), C Jones (Edmonton), K Turpin (Edmonton)*

Background: No nationwide, population-based studies have been published on the health status and health care utilization of community-dwelling Canadians with MS. *Methods:* Data on 302 persons with and 109,741 without MS were derived from the cross-sectional Canadian Community Health Survey 2000/2001(Statistics Canada). *Results:* The mean age of respondents with MS was 49; 68% were female, 87% Canadian-born and 96% Caucasian. Controlling for age and gender, persons with MS were more likely than those without to: rate their health as fair/poor (odds ratio = 12.2, 95% confidence interval = 8.6 - 17.2) and somewhat/much worse than last year (3.7, 2.7 - 5.0); report that health problems often impacted daily life (8.9, 6.3 - 12.6) and that they often had difficulty with activities of daily living (8.5, 6.2 - 11.6), or needed assistance with at least one daily living task (17.9, 12.3 - 26.1). Persons with MS consulted a doctor more frequently during the year (average 8.4 times) than persons without MS (4.5), and were more likely to be overnight patients (20.8% versus 8.6%), $p < .05$. *Conclusions:* Such data quantifies the impact of disease on community-dwelling Canadians with MS, suggesting that their health status deficits may be associated with greater health care utilization.

P-118

Opsoclonus-myoclonus ataxia syndrome associated with ADEM

M Dion (Montreal), D Nguyen (Montreal), P Cossette (Montreal), D Boghen (Montreal)*

Background: Opsoclonus-myoclonus ataxia syndrome (OMS) is a rare disorder characterised by abnormal eyes movements, brief jerky involuntary limb movements and ataxia. Conditions associated with this syndrome are multiple and include parainfectious, paraneoplastic, toxic and metabolic causes. *Method:* We describe a 33-year-old, HIV-seropositive woman on antiretroviral therapy with OMS associated with reversible lesions in the brainstem. The diagnosis of ADEM is proposed. A video-recording of the manifestations will be shown. *Results:* The patient presented with abnormal movements since one week. Opsoclonus at rest, myoclonic jerks affecting the face and limbs, and ataxia were noted. MRI demonstrated on T2- weighted images diffuse subcortical white matter abnormalities as well as in the left pons and right brachium pontis. After gadolinium, the lesions showed no enhancement. Cerebrospinal fluid (CSF) analyses were normal. The viral load and

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

CD4-count was < 50 copies/ml and 230 cells/microliter respectively. At one-month follow-up, the patient had improved and a second MRI showed complete resolution of the brainstem lesions. In face of the clinical and radiological recovery, the diagnosis of ADEM was proposed. *Conclusion:* This is a case of OMS in an HIV-patient with brainstem lesions corresponding to ADEM. This is in our knowledge the first case of ADEM associated with OMS.

P-119

Adherence to MS Disease Modifying Therapy: Why Are Injections Missed?

E O'Ferrall (Calgary), W Wall (Calgary), D Lavorato (Calgary), S Patten (Calgary), C Harris (Calgary), L Metz (Calgary), C MS Treatment Outcomes Group (Calgary)*

Background: The Calgary MS Treatment Outcomes Study determines long-term safety and outcomes in a population-based cohort exposed to disease modifying therapy (DMT). Adherence is an important determinant of efficacy which may be improved with better understanding why patients miss doses. In this dynamic cohort study participants complete questionnaires at 3, 6, and 12 months then annually. *Methods:* Questionnaires returned before May 2005 were analyzed in aggregate, by drug and by follow-up period. The number of missed injections during each interval, and contributing reasons, were tabulated. Incidence rates of non-adherence (by drug and interval) will be compared. Patients will be categorized by degree of adherence. *Results:* This analysis is based on data from 963 patients who completed 3177 questionnaires over 7 years. The average return rate was 73.2%. Participants included 78% women and 22% men. Mean age was 39.8 years. Mean disease duration was 7.9 years. During 50.9% of treatment intervals patients reported missing one or more injections. Mean annualized number of missed injections was 3.2 during the first 3 months then averaged 5.4 from month 3 to 60. Forgetting was the most frequent reason for missing injections. The proportion reporting forgotten injections increased from 16% at 3 months to 36% (mean) over years 2-5. The proportion of respondents that reported missed injections at 2 years for other reasons were: travel 17%, drug holiday 10.9%, non-MS medical 7.1%, busy or tired 4.6%, lack of drug 3.6%, and MS-related medical 2%. Missed injections due to travel or drug holiday increased in frequency over the first two years of therapy. Ongoing analysis will compare the proportion of missed injections by interval for each drug and categorize patient adherence. *Conclusions:* Better understanding of adherence issues for each drug, and during each time interval, will guide strategies to improve adherence.

P-120

Patient Reported Side Effects to MS Disease Modifying Therapy Over Five Years

L Metz (Calgary), D Lavorato (Calgary), W Wall (Calgary), C Harris (Calgary), S Patten (Calgary), C MS Treatment Outcomes Group (Calgary)*

Background: Common side effects of MS disease modifying therapies (DMT) are well known but their frequencies and persistence in clinical populations are poorly understood. The Calgary MS Treatment Outcomes Study describes long-term safety and outcomes in a population-based cohort treated with DMT. In this study participants complete questionnaires at 3, 6, and 12 months then annually. *Methods:* Patient reported side effects from questionnaires returned before May 2005 were tabulated at each follow-up period by treatment group: glatiramer acetate (GA) or interferon (IFN). *Results:* This analysis is based on data from 963 patients who completed 3177 questionnaires over 7 years (1812 using GA, 1365 using IFN). The average return rate was 73.2%. Participants included 78% women and 22% men. Mean age was 39.8 years. Mean disease duration was 7.9 years. Three months side effect rates by group (%GA versus %IFN) were: injection pain (41.7 vs 53.3), flu-like symptoms (15.4 vs 80.7), headache (14.6 vs 55.2), injection site reactions (12.3 vs 18.1), and post-injection reactions (14.9%, GA only). Side effect rates in the GA group remained similar between 6 and 60 months except injection site reactions which decreased to an average of 6.8% and post-injection reactions which increased to an average of 25.2%. Rates of injection pain and injection-site reactions changed little over 5 years in IFN patients but flu-like symptom rates decreased to 54.3% at 6 months, then averaged 44.76% at later intervals and headache rates decreased to 44.1% at 6 months then averaged 29.1%. *Conclusions:* While side effect continue at a substantial rate discontinuation due to side effects ranges from 15-20% over 5 years <O'Ferrall et al; Ruggiari et al>, suggesting that side effects are usually tolerable. This data should help patients better understand expected side effect rates and persistence for each treatment type and help caregivers target side effect management.

P-121

Impact of McDonald diagnostic criteria (MRI) in an MS Clinic setting

V Bhan (Halifax), S Smith (Halifax), T Campbell (Halifax)*

Background: Serial MRIs yield earlier diagnosis of multiple sclerosis in patients with Clinically Isolated Syndrome (CIS). We studied the prevalence and impact of this practice in our clinic. *Methods:* The Dalhousie Multiple Sclerosis Research Unit (DMSRU) is the only referral centre for MS patients in Nova Scotia. Data is acquired prospectively on all new and follow up visits. Using DMSRU database, we identified all CIS patients seen from January 2004 to July 2005. Chart review of the CIS patients was done, including review of MRI scans. Data were analysed using SPSS program. *Results:* 54 CIS patients with positive initial MRI were followed for a mean of 12 months. 36(67%) had repeat MRI scans, with 27/36(75%) meeting criteria for MS diagnosis. At last follow up, 37(65%) of the 54 CIS patients fulfilled criteria (clinical or MRI) for MS and 17(35%) retained CIS diagnosis. Immunomodulatory therapy was started in 17/27(63%) of MS patients diagnosed on the basis of MRI only, 6/8(75%) of CDMS and 2/19(10%) in "CIS only" patients. *Conclusions:* MRI criteria are frequently used in our MS Clinic and often yield earlier MS diagnosis. Most of these patients are treated with immunomodulatory drugs whereas "CIS only" patients are rarely treated.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-122

Devic's Disease in a 28 year-old Aboriginal male: MRI

J Gitlin (Saskatoon), J Tynan (Saskatoon), S Harder (Saskatoon)*

Background: Devic's disease is an idiopathic inflammatory disease of the central nervous system with clinical diagnostic criteria similar to multiple sclerosis (MS). We present a case of Devic's disease in a young Aboriginal male. *Methods:* The medical records and neuroimaging findings of a 28 year old Aboriginal male with Devic's disease were reviewed. Investigations included an MRI and optic nerve biopsy. *Results:* A 28 year-old Aboriginal male presented with progressive loss of visual acuity, beginning in his left eye and progressing to involve his right eye. In addition, he developed burning dyesthesias in the lower extremities with an associated Lhermitte symptom and gait imbalance. MRI demonstrated bilateral optic nerve and chiasmatic enhancement as well as a large cervicomedullary lesion with peripheral enhancement and central cavitation. Optic nerve biopsy revealed evidence of demyelination. *Conclusion:* This case demonstrates classic MR findings of Devic's disease in a young Aboriginal male. There is a low prevalence of MS among Aboriginal individuals but Devic's disease is not uncommon in this population.

P-123

Visual outcome of traumatic optic neuropathy in patients treated with intravenous megadose

M Mansouri (Tehran), A Sadeghi tari (Tehran), A Lashai (Tehran)*

Background: Although uncommon, traumatic optic neuropathy (TON) is an important cause of visual loss. Different therapeutic approaches including different dosages of steroids, surgical decompression of optic canal and observation alone have been suggested but there has been no conclusive evidence to establish a standard approach to this devastating cause of visual loss. *Patients and method*: To determine the effectiveness of intravenous (IV) steroids in the treatment of these patients, the medical records of patients with TON, including one bilateral case, treated with IV steroids were reviewed. *Results:* Twenty-eight patients (22 males, 6 females) with mean age of 24.1(11 to 41 years) were enrolled. All patients had received 30 mg/kg loading dose of methylprednisolone succinate followed by 5.4 mg/kg/hour for 48 hours. Visual acuity (VA) was improved by > 1 line in 8 eyes (28.6%) immediately after treatment and in 10 eyes (37%) after 3 months; however, most of them (6 and 8, respectively) were in the range of initial VA of no light perception to had motion. After adjustment for the baseline VA, these Improvements in visual acuities were not considered significant. Neither different orbital fractures, nor various extraocular muscle palsies had any significant effect on the prognosis of ultimate VA. *Conclusion:* Regarding the natural course of TON, this investigation showed that IV megadose steroids had no benefit on the visual outcome of patients with TON.

P-124

Frequency of Blood Testing in Multiple Sclerosis

R Leckey (Sydney), A Cossette (Trois-Rivieres), F Veloso (Regina), S Charest (Trois-Rivieres), B Jones (Kelowna), J Paulseth (Hamilton)*

Background: Health Canada in 2003 issued a safety advisory to all healthcare professionals on the use of interferon-â therapy for RRMS patients. This retrospective study has been designed to assess the frequency of blood testing in treated RRMS patients and to evaluate the prevalence of liver and thyroid dysfunction. *Methods:* A total of 151 patients from 6 sites across Canada participated in this study. Average treatment duration was 43 months. The current treatments were as follows: 20 patients on Avonex(r); 26 patients on Betaseron(r); 43 patients on Rebif(r); 60 patients on Copaxone(r); and 2 patients were on no current therapy. *Results:* No patient had more than 4 liver function tests conducted during the initial 6 months of therapy, and the vast majority (72.2%) had no liver function tests conducted during the initial 6 months of therapy. Furthermore, only 21.8% of interferon-â patients had regular/somewhat regular liver function tests performed after the initial 6 months of therapy. *Conclusion:* Few patients showed elevated ALT/AST levels given the lack of liver function testing. Considering the seriousness of this adverse event, and the potential for liver dysfunction with interferon-â drugs, liver function needs to be monitored more closely as per the Health Canada advisory.

P-125

Copaxone(r) PFS: Impact On Patient Satisfaction And Professional Caregiver Workload

R Leckey (Sydney), H Blanchard (Montreal), J Côté (Montreal), N Dumais (Gatineau), F Jacques (Gatineau), B Jones (Kelowna), A Lamontagne (Sherbrooke), P Laplante (Montreal), A Lavoie (Sherbrooke), T Murray (Halifax), L Plasche (Kelowna), L. Rocheleau (Montréal), S Walker (Sydney), P Weldon (Halifax)*

Background: Copaxone(r) pre-filled syringes (PFS) were developed to simplify self administration of glatiramer acetate and to reduce the time spent by professional caregivers on patient injection training. An automatic injection device, the autoject 2, further facilitates sub-cutaneous injection of drugs. *Methods:* Adult patients diagnosed with relapsing-remitting multiple sclerosis (MS) who met the indication for glatiramer acetate treatment were entered in this 2-month observational, open-label, three-arm trial. The primary objectives were to evaluate patient satisfaction and outcomes as well as to quantify the extent of disruption of daily activities when using Copaxone PFS with the autoject 2. The secondary objective was to measure the impact of such treatment on nursing workload. *Results:* Although patients tended to be neutral with respect to transporting Copaxone PFS, administering it at work, and about the discomfort of the injection per se, they were satisfied with all other aspects of Copaxone PFS used with the autoject 2. They found it easy to use and preferred it to other injectable MS therapies. *Conclusion:* Copaxone PFS markedly reduced the duration of injection-related activities as compared with Copaxone vials. It is expected that using Copaxone PFS rather than the vials will reduce professional caregiver workload.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

Nerve and Muscle

P-126

Genome-wide scan analysis of a new French-Canadian recessive form of congenital muscular dystrophy with hyperlaxity

M Tetreault (Montreal), A Duquette (Montreal), I Thiffault (Montreal), J Jarry (Montreal), L Loisel (Montreal), M Vanasse (Montreal), Y Robitaille (Montreal), B Brais (Montreal)*

Background: Joint hyperlaxity has been observed in different congenital muscular dystrophies often associated with concomitant joint contractures. We have recruited a group of 16 French-Canadian patients from Southwestern Quebec belonging to 13 different families displaying a recessive congenital muscular dystrophy with joint hyperlaxity (CMDH). Prior to this study we have excluded by linkage and sequencing analysis that this new form of CMD is caused by mutations in the three subunits of collagen VI mutated in Ullrich CMD which has an overlapping phenotype with CMDH. *Methods:* Extensive neurological examination, genome-wide scan and genetic mapping analysis LOD score value calculated with GENEHUNTER were used to uncover a new locus in this French-Canadian cohort. *Results:* We have carried out a genome wide scan (GWS) by genotyping 500 markers at 8cM intervals for 2 families. The GWS results combined to fine mapping analysis linked all our families to a 10cM candidate region (multipoint LOD score 5.3). Haplotype for markers in the region suggested that two more common mutations are present in the French-Canadian population explaining 81% of our cases. *Conclusion:* The identification of the mutated gene in CMDH may shed light on the biological basis of joint hyperlaxity and congenital muscular dystrophy.

P-127

Femoral Neuropathy and Lithotomy Position

T Townsend (Cleveland), C Chalk (Montreal)*

Background: Prolonged lithotomy position is frequently used during difficult labour and delivery or during complex pelvic surgical procedures. Peripheral nerve compromise associated with lithotomy position is thought to be rare; the reported incidence of post-partum lower extremity peripheral nerve injuries is 0.008%-0.92%. However, in 2004 we saw 3 cases of femoral nerve injury related to lithotomy position, and suspect that this entity is under-recognized. *Methods:* Two patients were young women who noted leg weakness and thigh numbness postpartum. Both were primiparous and had prolonged labour (stage 2 and 3 over 12 hours) with epidural anaesthesia. During labour, their hips were held more or less continuously in forced flexion and abduction by delivery room nurses. The 3rd patient underwent repair of a ureterocolic fistula secondary to colon cancer, and was maintained in lithotomy postion under general anaesthesia for 10 hours. *Results:* All patients had severe weakness of knee extension, absent knee reflexes, and impaired sensation over the anteromedial thigh (bilateral for the obstetrical patients; unilateral for the surgical patient). The signs in the postpartum patients improved and resolved completely one month postpartum. However, the surgical patient had persisting clinical and electrodiagnostic signs of a severe left femoral neuropathy 3 months later. *Conclusions:* These cases of femoral neuropathy related to lithotomy position emphasize the vulnerability of the femoral nerve during prolonged hip flexion, particularly when patients are receiving spinal or general anesthetics. This entity has been previously described, but we suspect it is under-recognized. Furthermore, it is preventable, either by avoiding prolonged lithotomy position, or by frequent repositioning of the legs during long obstetrical or pelvic surgical procedures.

P-128

Lead exposure as a risk factor for amyotrophic lateral sclerosis: a systematic review of the evidence

P Giacomini (Montreal), C Wolfson (Montreal)*

Background: The role of lead in the etiology of Amyotrophic Lateral Sclerosis (ALS) has been the subject of numerous studies with conflicting results. In this review we examine the best available evidence regarding the relationship between exposure to lead and the development of ALS. *Methods:* MEDLINE and The Cochrane Library were searched for publications (1966-May 2005) concerning lead exposure and ALS. Each eligible study was subjected to quality assessment using a tool designed to evaluate methodological rigor. The maximum quality score was 18, with a higher score reflecting greater methodological rigor. *Results:* Ten case control studies met the eligibility requirements. Of these, nine studies scored 10 or greater on quality assessment. The odds ratios for the relationship between lead exposure and ALS ranged from 1.1 to 5.7. *Conclusions:* Notwithstanding the limitations and heterogeneity of the studies, a consistent association between lead exposure and ALS was observed, and the association was stronger in those studies with the higher quality scores. In addition, in the studies in which lead exposure was quantified, a dose response relationship was observed. Using a rigorous approach, this systematic review provides the strongest available evidence for a credible association between exposure to lead and the development of ALS.

P-129

Spontaneous gluteal hematoma causing multiple mononeuropathies

P Boulton (Halifax), R Sadler (Halifax)*

Background: Spontaneous gluteal hemorrhage causing sciatic neuropathy is a rare complication of anticoagulation. We present a case of a 76 year-old female with lesions of three lumbosacral nerves, a previously unreported finding. *Methods:* The patient was assessed two days after heparinization for presumed coronary syndrome. During anticoagulation, she developed sciatica-like pain, swelling of her left buttock, weakness and numbness of the leg, urinary incontinence, and unilateral perianal anesthesia. The onset of symptoms was not preceded by trauma or injections of the buttock. Examination demonstrated profound weakness of all muscles innervated by the gluteal and sciatic nerves, with relative preservation of hip flexion/adduction and knee extension. Sensory loss was present in the distribution of the posterior femoral cutaneous, pudendal, and sciatic nerves. *Results:* CT scan showed a large hematoma of the left gluteal musculature compressing the aforementioned nerves at the greater sciatic foramen. Anticoagulation was stopped and conservative treatment initiated following surgical consultation. Two months after hemorrhage, no significant

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

improvement in weakness was seen, but sensory and bladder function improved to baseline. *Conclusion:* This patient developed multiple mononeuropathies secondary to anticoagulant induced gluteal hematoma. The failure of conservative treatment may suggest surgical evacuation of the hematoma should be attempted.

P-130

CTG Repeat Polymorphism at the Myotonic Dystrophy Locus in Healthy Iranian Population

B Shojasaffar (Tehran), N Moradin (Tehran), S Nafisi (Tehran), M Azimian (Tehran), K Kahrizi (Tehran), H Najmabadi (Tehran)*

Introduction: Myotonic Dystrophy type1 (DM1) is caused by large and unstable expansion of CTG repeats in DMPK gene which is located on 19q13.3 included CTG repeats in 3'UTR. Thirty seven to fifty repeats of CTG are reported in Permutation and over 50 to 5000 repeats have caused DM type1. This repeat number is highly polymorphic and in healthy individuals varies from 5 to 37. According to the hypothesis that expanded (CTG)n alleles originated from large size normal alleles, there is a correlation between the prevalence of DM1 and the frequency of large size normal alleles in a population . So DM1 is considered to be more prevalent in Europe and Japan but it is rare in Africa. It has also been proposed that DM1 is not prevalent in other parts of Asia including Iran. *Objective:* To determine the distribution of alleles in healthy Iranian population and the frequency of large size normal alleles. *Material and Methods:* Two hundred healthy individuals from different ethnic groups who live in Iran participated in this study. A polymerase chain reaction was conducted to determine the size of the alleles. *Result:* So far, our data reveals that 23.70% of alleles had 5 repeats, 23.25% had 6-8 repeats, 45.75% had 9-17 repeats and 7.25% of alleles had CTG repeats of more than 18. The most repeat number of CTG among normal allele was 28. *Conclusion:* The frequency of CTG≥18 is 9.83% in Western Europe and 9% in Japan which suggests that there is a correlation between the prevalence of DM1 in a population and the frequency of alleles with CTG≥18. What we have concluded up to now from our data shows that the frequency of alleles with CTG>18 is comparative to Western Europe and Japan.

P-131

Analysis of SMN mutations in Iranian SMA patients

M Hasanzad (Tehran), Z Golkar (Tehran), N Khodayari (Tehran), R Karimi-Nejad (Tehran), N Almadani (Tehran), K Kahrizi (Tehran), H Najmabadi (Tehran)*

Spinal muscular atrophy is one of the most common autosomal recessive disorders, with a carrier frequency of approximately one in 50. Spinal muscular atrophy can be classified based on age of onset and severity. SMA of all types is associated with homozygous mutations in the survival of motor neurone gene(SMN). Because of high rate of consanguinity in Iranian population, it seems that the incidence of the disease is very high. During the last five years,mutation detection was performed for 168 families. Among all of the cases that referred for carrier detection we found 70 patients with SMAI, 11 patients with SMAII and seven patients with SMAIII. Molecular analysis was performed for detection of SMN1 exon 7 deletion. Chorionic Villus Sampling (CVS) and Amniocentesis were performed for 33 and 10 fetuses, respectively, of which 6, 12, 25 cases were normal, affected and carrier, respectively. The most common type of SMA in our patients was SMA type I. 90 families with 70 affected cases belong to this group. The most common clinical findings in patients with SMA typeI was hypotonia with age of onset at birth to 18 month. In SMA type II we found developmental delay and hypotonia. Also seven patients with SMA type III had age of onset 2.5-30 years were associated with generalized muscle weakness and wasting , tongue fasciculation and decreased DTR. *Keywords:* SMA, SMN1, Iran.

P-132

Clinical, Molecular and IImmunohistochemistry investigations of neuromuscular disorders in Iranian populations

K Kahrizi (Tehran), M Hasanzad (Tehran), E Keyhani (Tehran), M Azimian (Tehran), F Layeghi (Tehran), J Urtizbrea (Paris), D Hantai (Paris), H Najmabadi (Tehran)*

Introduction: Neuromuscular disorders are the most common progressive group of heterogeneous disorders and there is considerable genetic heterogeneity in this group of disorders that over hundreds genes have been involved in neuromuscular disorders. The major symptoms of neuromuscular disorders are generalized muscle weakness and wasting, muscular atrophy, extraocular ophthalmoplagia, respiratory, cardiac, and other smooth muscles involvement. These disorders are classified as follows, myopathies (muscular dystrophies); neuromuscular Junction disorders (congenital myasthenic syndromes); neuropathies (Charcot- Marie - Tooth); motor neuron disorder (Spinal Muscular Atrophy).The aim of this study was classification of neuromuscular disorders based on clinical, molecular and immunohistochemistry (IHC) techniques in Iranian patients referred to Genetic Research Center during one year. *Result:* We found 82 patients with Myotonic Dystrophy, 19 Duchenne/Becker Muscular dystroophy (DMD/BMD), 21 Limb Girdle Muscular Dystrophy (LGMD), 3 Fascioscapulohumeral Muscular Dystrophy (FSHD), 2 Congenital Myasthenic Syndromes (CMS), 6 Congenital Muscular Dystrophy (CMD), 10 Spinal Muscular Atrophy (SMA) based on clinical examination, electromyography (EMG) and muscle enzymes. *Conclusion:* Therefore we must investigate the rest of the patients with DM diagnosis for DM2 and also the rest of patients with clinical symptoms of LGMD that they had normal sarcoglycan and dysferlin proteins in IHC. We need more analysis by using multiplex western blot technique to detect calpain, dysferlin, and sarcoglycan proteins in LGMD patients. More investigations are mandatory for finding of other types of neuromuscular disorders.

P-133

Carbaryl: a Cause of Toxic Peripheral Neuropathy

G Matte (Montreal), B Brais (Montreal)*

Organophosphate and organocarbamate exposures cause cholinergic and nicotinic syndromes. While organophosphate induced delayed polyneuropathy is well known, rare cases of axonopathy have been described after exposure to a carbamate pesticide such as carbaryl. *Objective:* Describe carbaryl induced polyneuropathy. *Method:* Case report. *Result:* A healthy 42 year old

man ingested 500cc of a 22,5% solution of carbaryl in a suicidal gesture and developed a cholinergic syndrome which evolved into a nicotinic syndrome and delirium. Five days later, a symmetrical distal weakness was observed with hypotonia and arreflexia. While the nicotinic syndrome was resolving, the patient became quadriplegic and developed some milder degree of trunk and bulbar weakness with sensory loss in a glove and stocking distribution. EMG performed on day 17 showed a severe sensory and motor axonopathy. Delirium completely resolved and the patient recovered some proximal strength. There was no evidence of trauma or recent infection or evolutive weakness prior to intoxication. No other pesticides or medications were taken by the patient or found in his surroundings. Street drugs and ethanol were undetectable on admission. No heavy metal intoxication, metabolic disturbances or hemoglobinopathy were found. *Conclusion:* Carbaryl, an organocarbamate pesticide, causes cholinergic and nicotinic syndromes and a peripheral neuropathy.

P-134

Radiation induced median neuropathy masquerading as carpal tunnel syndrome

P Giacomini (Montreal), V Panet-Raymond (Montreal), C Freeman (Montreal), C Chalk (Montreal)*

Background: Brachial and lumbosacral plexopathies are well-recognized sequelae of radiation therapy, but radiation injury of more distal peripheral nerves is rarely described. *Methods:* A 26 year-old woman with 5 months of left hand numbness was referred for carpal tunnel syndrome. She denied weakness. Three years earlier, she had undergone radiotherapy (60 Gy in 30 fractions) for a clear cell synovial sarcoma of the left wrist. She suffered severe skin toxicity following her treatment that resolved over time. She did not receive chemotherapy. She had no neurological complaints for the 2 years prior to her presenting symptoms. Examination showed mild weakness of thumb abduction and decreased sensation in the left index finger. *Results:* Nerve conduction studies showed decreased left median sensory amplitudes, but normal distal latencies. The median motor amplitude recorded from APB was severely decreased, but the distal latency was only slightly prolonged. Ulnar nerve conduction studies and needle EMG of pronator teres were normal. *Conclusion:* Although the patient had symptoms, signs, and nerve conduction studies consistent with a distal median neuropathy, the electrodiagnostic findings were not typical of median nerve compression in the carpal tunnel. We think the clinical picture and neurophysiology more likely reflect delayed radiation injury to the distal median nerve.

P-135

Pre-thymectomy Intravenous Immunoglobulin versus Plasmapheresis in Myasthenia Gravis: An Inquiry into Canadian Practice

S Plessis (Vancouver), K Chapman (Vancouver)*

Background: The optimal pre-thymectomy management of patients with myasthenia gravis (MG) has not been determined. Intravenous Immunoglobulin (IVIg) and Plasmapheresis (PLEX) are used pre-operatively. Recent studies suggest that pre-operative IVIg may be better tolerated and provide similar efficacy as PLEX. Our objective was to determine current Canadian practice. *Methods:* Literature review was conducted. A survey was sent to Canadian Neuromuscular Disease Neurologists and Apheresis Centers. *Results:* There is variability in the literature and in current practice among Canadian centers in terms of choice of treatment, timing and dosing regime. Not all centers routinely pre-treat. Choice of treatment ranges from IVIg 10% of the time and PLEX 90%, while others use 90% IVIg and 10% PLEX. There are differences in the number of plasma exchanges given (2 to 5), either daily or on alternating days. IVIg total dose was 2g/kg, however, some sites treated over 2 days, others over 5 days. Timing ranged from 2 to 14 days prior to surgery. *Conclusion:* Factors used for deciding treatment regimes include availability, previous response, risk factors, and anecdotal efficacy. There is no clear consensus as to the best pre-thymectomy treatment for MG in Canada. Further study is needed to establish optimal treatment.

NEURO-ONCOLOGY

P-136

The role of Endoscopy in the management of brain tumors

M Jalaluddin (Riyadh)*

Objective: The purpose of this study is to find out the role of endoscopy in the management of brain tumors. *Introduction:*Many patients with brain tumors in pineal region, tectum, thalamus, ventricles and suprasellar area can be managed by endoscopic procedures with low morbidity & mortality. *Methods:* We have managed 75 patients of brain tumors with endoscopic procedures since 1st Jan.1996 to 30th Nov.2005, at KFSH & RC. These 75 patients had 96 endoscopic procedures, which include 35 tumor biopsy, 35 3rd ventriculostomies, 15 septostomies and 4 fenestration of tumor cysts and 7 ommaya reserviour placement in the tumor cyst. *Results:* There were no operative mortalities.The tumor biopsy was diagnostic in all 35 patients. Out of 35 patients with 3rd ventriculostomy, 6 required Ventriculo-peritoneal shunt.One had venous bleeding from the tumor, managed by irrigation & external ventricle drain. One patient with tectal tumor had 3rd ventriculostomy and removal of two ventriculo-peritoneal shunts after 19 years of initial diagnoses. The average duration of surgery was 50 minutes(minimum 25 minutes & maximum 150 minutes), which was 1/2 the duration of standard surgery.The total cost involved was 1/2 to 1/3 as compared to standard neurosurgical procedures. *Conclusion:* We conclude that endoscopy is safe & cost effective for the management of brain tumors.

P-137

Differences in cell death of DNA-dependent protein kinase defected glioblastoma cells upon stimulation by staurosporine and hydrogen peroxide

G Chen (Hong Kong), B Leung (Hong Kong), W Poon (Hong Kong)*

Introduction: There is not a single therapeutic approach to be universally applicable for glioblastomas, largely due to our poor understanding of their pathogenesis and insufficient interventions available. It is now known that various DNA double-strand break

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

repair mechanisms, in which DNA-dependent protein kinase (DNA-PK) has a major role, are not only involved in the development of glioblastoma but also the treatment of this malignant cancer. *Methods:* The aim of the present study was to investigate how glioblastoma cells responded to hydrogen peroxide and staurosporine (STS) and how such a response was related to DNA-PK. Two human glioblastoma cell lines, M059J cells that lack DNA-PK activity and M059K cells that express a normal level of DNA-PK, were exposed to hydrogen peroxide or STS. The response of the cells to hydrogen peroxide or STS was recorded by measuring cell death, which was detected by three different methods, MTT, annexin-V and propidium iodide staining, and JC-1 mitochondrial probe. *Results:* The result showed that both hydrogen peroxide and STS were able to induce cell death of glioblastoma but the former was mainly associated with necrosis and the latter with apoptosis. Glioblastoma cells lacking DNA-PK was less sensitive to STS treatment than those containing DNA-PK. However, DNA-PK had no significant influence on hydrogen peroxide treatment. We further found that catalase, an antioxidant enzyme, could prevent cell death induced by hydrogen peroxide but not by STS, suggesting the pathway leading to cell death by hydrogen peroxide and STS was different. *Conclusions:* hydrogen peroxide and STS have differential effects on cell death of glioblastoma cells lacking DNA-dependent protein kinase. Such differential roles in the induction of glioblastoma cell death can be significant in selecting and/or optimizing the treatment for this malignant brain tumor.

P-138

Intractable vomiting as the unique manifestation of a subependymoma of the medulla not visualized on MRI

N McLaughlin (Montreal), M Laroche (Montreal), M Bojanowski (Montreal)*

Background: Posterior fossa lesions can present with protracted vomiting. However pre-operative diagnosis might be difficult in the presence of confounding findings and absence of a recognized lesion on magnetic resonance imaging (MRI). *Methods:* Case report and review of the literature. *Results:* A 47-yr-old man in good health was referred for incoercible vomiting occurring daily for 2 months without associated headaches. The neurological examination was normal. MRI revealed herniation of cerebellar tonsils, hydrocephalus involving the 4th ventricle, with compression of the pons and medulla. No expansive lesion was found on MRI. Given the normal state of arousal and the absence of headache, hydrocephalus was believed not to be responsible for the vomiting. A sub-occipital craniotomy revealed a grayish tumor filling the 4th ventricle and infiltrating the lateral medulla suggestive of a subependymoma. Post-operatively the hydrocephalus and the digestive symptoms resolved. *Conclusion:* Intractable vomiting in the absence of headache and altered arousal state should orient towards a 4th ventricular lesion. Herniated cerebellar tonsils might hide isodense non-enhancing tumors of this region.

P-139

Eosinophilic Rich Meningioma - Case report

C Kazina (Winnipeg), M Del Bigio (Winnipeg), H Fewer (Winnipeg)*

Background: The WHO classification of meningiomas is based on histological subtypes with distinguishing architectural patterns. We report a case of a meningioma with unique histopathological characteristics: meningothelial cell proliferation with a severe chronic inflammatory cell infiltrate consisting largely of eosinophils. The 63 year-old diabetic aboriginal female patient had intermittent eosinophilia, before and after resection, however has never been diagnosed with a systemic inflammatory disorder. *Methods:* A review of the clinical case, histopathology, and follow-up data was performed. In addition, a review of the medical literature regarding the pathological variants of meningioma was conducted. *Results:* Sections of this tumor revealed whorls of meningothelial cells, streams of collagenous tissue, and an abundance of eosinophils. In some areas the eosinophil aggregates formed the bulk of the tissue, mixed with scattered plasma cells and lymphocytes. Granulomatous inflammation, parasites or fungus, and histiocytosis were ruled out. Possibly this represents a variant of Lymphoplasmacyte Rich Meningioma, however, there is no documentation in the medical literature of meningioma with prominent eosinophil infiltration. Three years of follow-up has not identified any recurrent growth. *Conclusions:* A meningioma with unique histopathological characteristics is presented. It is difficult to define this tumor on the spectrums of menigioma subtypes and neoplastic or reactive etiologies. Prognosis is unknown.

P-140

Minimally invasive keyhole craniotomy with METRx(tm) tubular retractors: a novel technique for surgical resection of brain lesions

L Crevier (Hamilton), A Cenic (Hamilton), N Murty (Hamilton), K Reddy (Hamilton)*

Introduction: The purpose of this study was to evaluate the safety, efficacy, and utility of a novel technique for resection of intracranial lesions using frameless image-guided keyhole craniotomy and a tubular retractor system. *Methods:* From October 2005 to January 2006, five patients underwent resection of their cerebral lesion at McMaster University using our new surgical strategy. Two patients presented with metastatic brain tumors, two with high-grade glial tumors, and one with a hemorrhagic cavernous malformation. All lesions were deep sub-cortical. *Results:* All five lesions were successfully treated, either with complete removal or aggressive subtotal resection, with minimal or no permanent morbidity and no mortality. The patients tolerated the surgical procedure well. There was no intraoperative complication, and blood loss was comparable or less than a standard craniotomy. The surgical technique with its potential advantages and current limitations are discussed. *Conclusion:* Tubular retractor assisted image-guided craniotomy appears to be a safe and effective way of resecting deep intraparenchymal brain tumors and cavernous malformations. Larger prospective studies are required to further explore the efficacy, benefits, and potential limitations of this new approach.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-141

A new vision assessment scale for patients with sellar/suprasellar region tumors: The McMaster Vision Scale

L Crevier (Hamilton), I Vanek (Hamilton), K Reddy (Hamilton)*

Background: Patients with sellar/suprasellar region tumors are at risk for developing visual deficits, with or without treatment. Although essential, adequate vision monitoring is often poorly done and inadequately documented in clinical practice. The purpose of this study was to create a simple standardized vision assessment scale in order to provide guidance in the medical and/or surgical treatment of these patients. *Methods:* After reviewing the literature and consulting with clinical experts, an item pool was devised. Three items were selected by consensus among the authors: visual acuity, visual fields, and extraocular movements. A scoring system was developed for each item. The total score ranges from 0 to 30 for each eye. *Results:* A Generalizability Study involving 10 patients and four observers on two different occasions was carried out. A total of 160 observations were available for statistical analysis. Test-retest, inter-observer, and internal consistency coefficients were calculated. Face, content, and construct validity were assessed. *Conclusion:* The McMaster Vision Scale appears reliable. The scale is quick and simple to use, and should be easily implemented in the clinical setting. Further testing will be required to determine the significance of a single score and the magnitude of score deterioration that is clinically meaningful.

P-142

Hypothalamic-opticochiasmatic gliomas in children mimicking craniopharyngiomas

F Maroun (St. John's), J Jacob (St. John's), G Murray (St. John's), E Walsh (St. John's), P Bartlett (St. John's)*

Background: Suprasellar masses in children include hypothalamic-opticochiasmatic gliomas (HOCGS) and craniopharyngiomas. In certain instances HOCGS can mimick craniopharyngioma. *Methods:* A 13 year old girl presented with a few months history of headache, vomiting and visual failure. Cystic and solid suprasellar tumour was evident with bony destruction. *Results:* Transphenoidal partial removal of the mass revealed a glioma. Subsequent transcallosal approach with subtotal removal was needed. Follow up after nine years shows residual stable tumour. *Conclusions:* Even though accurate pathological diagnosis can be made preoperatively with neuroimaging, one must be aware and prepared for finding other types of tumour and should have alternative plans for the surgical approach.

P-143

Topographic classification of anterior fossa meningiomas (AFM): Lateral subfrontal pterional versus bifrontal interhemispheric approaches

G Mohr (Montreal), B Sade (Montreal), J Vézina (Montreal)*

Background: Characterization of AFM is often unclear due to overlapping origins. Controversy remains regarding the surgical approach in larger lesions. *Methods:* 31 AFM were treated using Lateral Subfrontal Pterional (LSP - 18 cases) or Bifrontal Interhemispheric (BFIH - 13 cases) approaches. Lesions were classified according to size and involvement of anterior fossa segments:

1. Olfactory - Crista Galli,
2. Planum Sphenoidale,
3. Jugum Sphenoidale,
4 Tuberculum Sellae - Diaphragma Sellae.

Type I, one segment, and/or <2.0 cm (2 cases)
Type II, two segments, and/or 2.0-3.9 cm (12 cases)
Type III, three segments, and/or 4-5.9 cm (9 cases)
Type IV ("Giant "), four segments, and/or ≥6 cm (8 cases)

"Invasive" was specified when extension into nasal cavities, infiltration or encasement of cavernous sinus(es) or carotid artery(ies) existed. *Results:* The LSP and BFIH were used respectively in 2 and 0 cases of Type I, in 10 and 2 cases of Type II, in 5 and 4 cases of Types III, in 1 and 7 cases of Type IV, indicating an increasing trend in favour of BFIH in large and giant lesions. *Conclusions:* A comprehensive classification for AFM based on incremental topographic involvement of anterior skull-base segments facilitates standardization and selection of the most efficient surgical approach.

P-144

Multifocal gliosarcoma: a rare case report

D Warren (Vancouver), S Yip (Vancouver), B Toyota (Vancouver)*

Background: Gliosarcoma (GS) is a rare primary central nervous system (CNS) tumor consisting of glial and mesenchymal components. This mixed malignant tumor of the CNS accounts for 1.8-8% of glioblastomas in the reported series. This is the third report of multi-focal GS within the English language literature. *Method:* This is a single case report of a 66 year-old man admitted to Vancouver General Hospital for cognitive decline, headache and language deficit. Initial diagnosis on radiological imaging was metastatic disease. All further investigations failed to reveal a primary tumor. Due to the volume of the left temporal lesion resection was performed using neuronavigation. *Result:* The patient had three lesions; two were in the right frontal lobe and one in the left temporal lobe. Tissue was sent intra-operatively for frozen section which revealed mixed glial and sarcomatous tissue. The operation was completed and the patient recovered well. Further therapeutic intervention is ongoing. *Conclusion:* This rare third case of multi-focal GS allows for review of the natural history. This includes a review of the clinical aspects, epidemiology, diagnosis and management. We also review the literature on pathological aspects of GS.

P-145

Visual outcome in surgically treated suprasellar meningioma

M Mehrazin (Tehran)*

Background & Objective: The removal of suprasellar meningioma may be associated with significant operative morbidity because of vicinity of major blood vessels and vital structures such as hypothalamus to the optic nerves and chiasm. The objective of the study is to evaluate influence of surgery on visual outcome in suprasellar meningioma. *Method:* 45 patients with suprasellar meningioma whom were operated from 1998 to 2005 were studied retrospectively. Visual acuity and field, size and site of tumor were determined preoperatively. *Results:* Among 45 patients who

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

underwent surgery, 34 (71.1%) cases had total tumor removal and 11(28.9%) subtotal; 5 (11%) patients died postoperatively and 2 missed to follow up. Patients followed in range of 0.5 to 7 years. Follow up showed that 26 patients had visual improvement in at least one eye while 10 patients found worsening of vision in one or both eyes and 2 cases had stable vision in both eyes. Data analysis show no significant relation between visual outcome and extent of tumor removal or surgical approach.(P value=0.211 & 0.709 respectively). Visual outcome was better in patients with preoperative vision more than 1meter finger counts.(P value=0.003). 11 patients found tumor re-growth or reoccurrence and managed by surgery or radiotherapy or both modalities. Visual follow up showed less vision in these patients but no significant relation exist between tumor re-growth and visual outcome. (P value=0.116). *Conclusion:* Visual outcome in surgically treated suprasellar meningioma is good and tumor must be removed as much as possible. All patients must be evaluated at regular intervals for detection of tumor re-growth or reoccurrence which result in bad visual outcome if not treated at proper time.

P-146

Rhabdoid Meningioma and Meningioma with Rhabdoid Features: A Clinicopathologic Correlation

R Yong (Vancouver), R Akagami (Vancouver), J Maguire (Vancouver)*

Background: Rhabdoid meningiomas are characterized by rounded cells with eccentric nuclei, prominent nucleoli, and abundant eosinophilic cytoplasm containing whorled intermediate filmaments. In the 2000 World Health Organization classification, meningiomas with a predominantly rhabdoid morphology are considered malignant. It remains unclear whether benign or atypical meningiomas with focal rhabdoid features also have an aggressive clinical course, or a propensity to progress into malignant meningiomas. *Methods:* All published cases of rhabdoid meningioma and meningioma with rhabdoid features were reviewed. A similar retrospective review was performed for all rhabdoid meningiomas and meningiomas with rhabdoid features diagnosed at our institution. *Results:* Fifty-one patients had a total of 56 meningiomas with rhabdoid features with at least 2 years of clinical follow-up. None of the 4 WHO I meningiomas with rhabdoid features behaved aggressively (recurred or progressed requiring intervention within 2 years), while 16 of 21 WHO II meningiomas with rhabdoid features behaved aggressively. The mean time to recurrence in this group was 25 months. Among 31 WHO III rhabdoid meningiomas, 25 behaved aggressively, with a mean time to recurrence of 10 months. *Conclusion:* Atypical meningiomas with focal rhabdoid features demonstrate high rates of aggressive behaviour. Such a diagnosis warrants strong consideration of aggressive surgical management with adjunctive radiotherapy.

P-147

Brain metastases in the rolandic region representing the hand: surgery vs radiosurgery

P Khoueir (Montreal), A Bouthillier (Montreal), M Barkati (Montreal), C Lambert (Montreal), M Fortin (Montreal), J Bahary (Montreal), R Moumdjian (Montreal)*

Background: Surgical treatment of brain metastases in the rolandic region is controversial, as some consider alternative treatment such as radiosurgery safer. The objective of this study was to evaluate and compare the benefits and risks of surgery with radiosurgery in the rolandic region representing the hand. *Methods:* We retrospectively reviewed the clinical and radiological outcome of patients with brain metastases in the rolandic region representing the hand who underwent surgery or radiosurgery. *Results:* We identified seven patients who had surgery and twelve who had radiosurgery in this region. All patients in the surgical group showed no clinical deterioration and no recurrence with regression of their vasogenic edema. Comparing those results with radiosurgery, 42% of patients in this group had clinical deterioration ($p<0.05$), 25% had tumor progression, and only 42 % showed vasogenic edema regression ($p<0.02$). *Conclusion:* Considering the limits of our retrospective study, surgical resection of metastases in the rolandic region representing the hand is probably as safe as radiosurgery. Surgery should not be rejected as an alternative treatment to radiosurgery.

P-148

New insights into the pathobiology of cervical spondylotic myelopathy: Molecular data from human tissue and a mutant mouse model

W Yu (Toronto), T Liu (Toronto), D Baptiste (Toronto), M Fehlings (Toronto)*

Introduction: Although cervical spondylotic myelopathy (CSM) is a common cause of spinal cord dysfunction, little is known regarding the molecular mechanisms for the progressive neural degeneration in this condition. Based on our work in neurotrauma, we hypothesized that Fas-mediated apoptosis plays a key role in the pathobiology of CSM. *Methods:* Molecular analyses of postmortem human spinal cord tissue from patients with CSM were complemented by studies in twy/twy mice, which harbour an abnormality in the Npps gene and develop ossification at C1-C2 with progressive spinal cord compression. We used histology and MRI to determine morphological changes in twy/twy mice. Apoptosis was assessed by morphological staining and Western blotting for caspase-3 and caspase-9 and the TUNEL technique. The expression of Fas was assessed using immunohistochemistry and immunoblotting. *Results:* TUNEL and caspase-3 positive neurons and oligodendrocytes, which co-expressed FAS, were observed in the cervical spinal cord of CSM patients and of twy/twy mice. The twy twy mice developed spasticity and quantitative neurobehavioral abnormalities which correlated with progressive loss of neurons and oligodendrocytes, Wallerian degeneration, demyelination and astrogliosis. Using immunoprecipitation and western blotting techniques we observed that the spinal cord tissue of twy/twy mice had activation of the Fas pathway with increased interactions between Fas, FasL and pro-caspase-8 and downstream activation of

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

caspase 3. *Conclusion:* Our data show an important Fas-mediated apoptotic mechanism in CSM, and provide evidence that down-regulation of Fas mediated apoptotic pathway is a potentially attractive neuroprotective approach in CSM which could be complementary to surgical decompression.

P-149

Tectal plate ganglioglioma: A case report

J Souster (Edmonton), E Johnson (Edmonton), S Naik (Edmonton), V Mehta (Edmonton)*

Background: We report a rare case of tectal plate ganglioglioma in a 15-year-old female presenting with a one month history of headache and vomiting. Imaging revealed obstructive hydrocephalus and an enhancing tectal plate lesion. Serum tumor markers were negative. *Methods:* An endoscopic biopsy and third ventriculostomy (ETV) were performed. Although the ETV successfully treated her hydrocephalus, symptoms related to the primary tumor persisted. Complete resection of her tumor was achieved via a supracerebellar infratentorial approach. *Results:* Endoscopic biopsy was non-diagnostic but pathological examination of the resected tumor showed a ganglioglioma (WHO grade 1) in which focal clusters of globoid ganglion cells, immunoreactive for synaptophysin and CD34, were dispersed in a microcystic piloid gliomatous parenchyma. *Conclusion:* Tumors of the tectal plate are almost exclusively low grade indolent gliomas. Many of these lesions are asymptomatic; when symptoms do occur a cerebrospinal fluid diversion operation is all that is usually required. However, a small percentage are locally aggressive, not withstanding their low-grade classification. A risk factor for this aggressive subtype may be contrast enhancing lesions which are greater than 2.5 cm in size, as was this patient's. Her lesion turned out to be a ganglioglioma, which has been reported in this location in only 8 cases.

P-150

The value of the extent of resection on the survival of patients bearing glioblastoma

D Fortin (Sherbrooke), M Fournier-Gosselin* (Sherbrooke), E Cardin-Langlois (Sherbrooke), J Ouattara (Sherbrooke), A Tsanaclis (Sherbrooke)*

Background: The contribution of the surgical extent of resection (EOR) on the survival of patient bearing glioblastoma is a matter of controversy. Although some studies have identified a survival advantage to a maximized EOR, several authors have contradicted these findings. These studies are often limited by different biases. With the goal of limiting these biases and standardizing our study group, we conducted the following analysis. *Methods:* Only patients operated at our institution, with a diagnosis of glioblastoma were considered. MRI had to be obtained within two weeks prior to surgery and within one week after surgery for eligibility. Briefly, axial T1 enhancing images were analyzed using an image analysis software. The pre and post operative images were matched and corresponding pre and post operative pixel volume values were generated and converted in a ratio. This EOR ratio, was then analyzed with a host of prognostic variables, initially in a univariate model, and then in a multivariate analysis. *Results:* Sixty-eight patients met all the criteria for the study. An EOR > 85% was identified as significant, in impacting survival. Interestingly, this significance dropped once variable assessing the biology of the tumour (KI-67 and P53 staining indeces) were introduced in the multivariate model. *Conclusion:* Although surgery has an impact on the survival of patients with glioblastoma, this impact is inherently limited by the biological characteristics of individual tumour.

P-151

5-FU delivered by means of blood-brain barrier disruption in F98-Fischer rats

M Fournier-Gosselin (Sherbrooke), D Fortin (Sherbrooke)*

Background: 5-Fu is an antimetabolite cytotoxic agent prominently used in the clinic. This agent depicted some activity against glioma cell lines, but poorly penetrate the blood brain barrier. We undertook to study the toxicity and activity of this drug, when administered intra-arterially, with and without prior blood brain barrier disruption (BBBD). *Methods:* 5-FU showed activity in the F98 glial cell line when tested in vitro with a WST-1 essay on cell proliferation. After assessing the in vivo toxicity and adjusting the optimal dose, 3 groups of 10 implanted F98 rats were treated at 10 days post implantation with a dose of 400 ug/m2 of 5-Fu, administered as follows: intravenously, intra-arterially, and intra-arterially after BBBD. One additional group served as a control group. The animals were allowed to recover from the procedure, and were followed clinically, until they reached a state of drowsiness, at which time they were sacrificed. *Results:* All treated groups presented a slight survival advantage to 5-Fu. The BBBD group presented the most important survival advantage of all the treated groups with a median survival of 28 days, compared to 24 days for the control group. *Conculsion*: 5-FU, when administered to F98 glioma rats by means of BBBD depicted a significant activity. This data will form the basis of a clinical phase I study.

P-152

Epidemiology of Primary Intracranial Tumors in Iran, 1978-2003

P Yavari (Tehran), M Mehrazin (Tehran)*

Background: Pattern of primary brain tumors have not been reported in Iran and the etiology remains largely unknown. The purpose of this study was to review cases of brain tumors treated in Shariati Hospital during twenty five years. *Method:* A retrospective study was made of 3437 cases who were hospitalized with brain tumors. The frequency distribution of brain tumors by age and sex, and histology was calculated. *Result:* The overall ratio of male/female cases was 55.4% to 44.6%, vary significantly (P<.05). The average age of the patients at the diagnosis was 33.9 years (SD= 18.1). The mean age of females was not significantly different than that of males. Of recorded series cases, 20.1% brain tumors occurred in children 15 years and younger with the mean ± sd age was 8.7 ± 3.90 years, and 79.9 % of cases in adults with the mean ± sd age, 40.19 ± 14.42 years. There was a significance difference in adults compared to under 15 years old (P<.05). The five most common histological types in both sexes among patients were Meningioma in 892 cases (26%) followed by Astrocytoma in 805 cases (23.4%), pituitary adenoma in 488 cases (14.2%), Glioblastomaoma in 278

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

cases (5.1%) and Ependymoma in 166 cases (4.8%). These account for 84 % of all brain tumors cases. Male predominance was observed in the Astrocytoma group, Craniopharyngioma, Ependymoma, Glioblastoma, Medulloblastoma, and Pitutary Adenoma. Meningiom were the only tumors with a significant excess in females ($p< 0.05$). *Conclusion:* The results present an important epidemiological understanding of patients with brain tumors. Data provides a baseline for further studies on the evaluation of brain tumors in Iran and also encourage further, wider epidemiological studies of a prospective nature. *Keywords:* Epidemiology, Brain tumors, Meningioma, Astrocytoma.

P-153

A Novel Mechanism for Invasion and Intracerebral Migration of Brain Tumours

D Maret (Montreal), D Colman (Montreal), R Del Maestro (Montreal)*

Background: Cadherins mediate intercellular adhesion. The prodomain of N-cadherin is cleaved rendering the mature protein competent to mediate adhesion at the cell surface. N-cadherin expression correlates with increased motility and pro-N-cadherin lacks adhesive function. We hypothesized that loss of adhesion due to aberrant surface expression of pro-protein may be a mechanism for enhanced motility in brain tumour cells. *Methods:* An N-cadherin mutant was engineered where the prodomain is cleaved by coagulation factor Xa at the surface, instead of endogenous proteases. This construct was transfected into the least aggressive tumour cells to test the effect of pro-protein expression on cellular behaviours. *Results:* Uncleaved pro-N-cadherin accumulates at the surface in more aggressive brain tumour cells compared to less aggressive cells. Furthermore, pro-N-cadherin surface expression promotes cell migration in wound-healing assays, and increases invasion into collagen, compared to wild-type cells or mock-transfected cells. These effects on cell motility are abrogated upon treatment with factor Xa, presumably via cleavage of the prodomain and activation of the adhesive function of mature N-cadherin. *Conclusions:* Our work suggests that abnormal expression of pro-N-cadherin on the surface of certain brain tumour cells plays a pivotal role in augmenting cell migration by compromising adhesive function of N-cadherin.

P-154

Targeting the IGF-IR inhibits glioblastoma growth in orthotopic brain tumor models and induces state of dormancy

A Samani (Montreal), R Del Maestro (Montreal), J Nalbantoglu (Montreal), P Brodt (Montreal)*

Background: The median survival time for glioblastoma multiforme patients undergoing surgery and standard radiotherapy is just over one year, highlighting the need for alternative therapeutic approaches. *Methods:* We produced a pseudotyped retrovirus expressing an IGF-IR antisense RNA (vLTR-IGFIR-AS). Human U87 MG-LacZ and rat C6-LacZ glioblastomas were transduced with the vLTR-IGFIR-AS retroparticles either prior to, or following the orthotopic, intra-cerebral injection of the cells. The effects of the retroparticles on tumor growth and long term animal survival were evaluated. *Results:* Ex-vivo transduction of rat C6 cells with vLTR-IGF-IRAS retroparticles prior to intra-cerebral implantation caused a significant increase in the proportion of apoptotic cells relative to controls and a marked reduction in tumor volumes as measured on day 24 post injection ($p<0.0015$). This resulted in a significant increase in long term animal survival with more than 70% of the rats alive at 182 days ($p<0.01$). Interestingly, the analysis of brain tissue obtained from surviving, healthy animals 182 days post inoculation revealed the presence of multiple, widely disseminated, solitary cells that retained the expression of a β-galactosidase marker protein, but were Ki67-negative, consistent with the acquisition of a growth-arrested (dormant) phenotype. Moreover, in vivo injection of the retroviral particles into pre-implanted C6 glioma tumors growing in the brain was also effective in blocking tumor growth reducing tumor volumes by 22% relative to controls ($p<0.026$). This marked anti-tumorigenic effect of the vLTR-IGFIR-AS particles was confirmed with vLTR-IGFIR-AS- transduced human U87 glioma cells that were implanted orthotopically into athymic nude mice. Tumor volumes in animals implanted with these cells were significantly reduced relative to controls and this led to increased long term animal survival, with 70% of animals still alive at 6 months post injection. *Conclusions:* Our data provide a compelling rationale for developing glioblastoma gene therapy based on intracerebral targeting of the IGF-I receptor.

P-155

Suprasellar pilocytic astrocytoma with spinal drop metastases

O Grigenas (London), J Keith (London), D Macdonald (London), R Hammond (London), J Megyesi (London)*

Background: Pilocytic astrocytoma is a tumor that usually occurs intracranially and it is usually solitary. We present the case of a patient with a treated suprasellar pilocytic astrocytoma that presented with spinal drop metastases five years later. *Case Report:* A 23-year-old female presented in 2000 with a history of headache and was found to have a suprasellar mass. She underwent craniotomy and subtotal resection of a pilocytic astrocytoma at that time. A follow-up MRI scan of the head six months later showed tumor growth. She underwent focal radiotherapy to the residual tumor with good local control. In 2005 she developed back pain and left leg pain resembling sciatica. An MRI scan of the spine showed an intradural 2 cm enhancing mass at the caudal end of the thecal sac at the S1 level. She underwent laminectomy and excision of the mass which was confirmed to be pilocytic astrocytoma. After surgery her left leg pain improved. A post-operative MRI of the spine showed successful removal of the S1 tumor, but revealed a 5mm tumor at the right posterior aspect of the spinal cord at the T3/T4 level.
Discussion: Review of the literature reveals that intracranial pilocytic astrocytoma with spinal drop metastases is a rare entity.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-156

Isolation of a Natural Inhibitor of Human Malignant Glial Cell Invasion: Inter A-Trypsin Inhibitor Heavy Chain 2

T Werbowetski-Ogilvie (Montreal), N Agar (Montreal), R Waldkircher de Oliveira (Montreal), D Faury (Montreal), Antel (Montreal), N Jabado (Montreal), R Del Maestro* (Montreal)*

Background: Malignant central nervous system (CNS) tumors, such as glioblastoma multiforme, invade the brain and disrupt normal tissue architecture, making complete surgical removal difficult. *Methods:* We have developed and optimized a purification strategy to isolate and identify inhibitors of glioma cell invasion in a three-dimensional collagen type I matrix. Inter A-trypsin inhibitor heavy chain 2 (ITI H2) was identified from most inhibitory fractions and its presence was confirmed both as a single protein and in a bikunin-bound form. *Results:* Stable overexpression in U251 glioma cells validated ITI H2 strong inhibition of human glioma cell invasion together with significant inhibition of cell proliferation and promotion of cell-cell adhesion. Analysis of primary human brain tumors showed significantly higher levels of ITI H2 in normal brain and low-grade tumors compared with high-grade gliomas, indicating an inverse correlation with malignancy. The phosphatidylinositol 3-kinase/Akt signaling cascade seemed to be one of the pathways involved in the effect of ITI H2 on U251 cells. *Conclusion:* These findings suggest that reduction of ITI H2 expression correlates with brain tumor progression and that targeting factors responsible for its loss or restoring the ITI supply exogenously may serve as potential therapeutic strategies for a variety of CNS tumors.

P-157

Malignant Glioneuronal Tumour in a Pediatric Patient: a Case Report

R Avery (St. John's), F Maroun (St. John's), J Barron (St. John's), B Cramer (St. John's), E Walsh (St. John's), G Murray (St. John's), A Engelbrecht (St. John's)*

Background: Malignant glioneuronal tumours (MGNTs), a newly recognized entity, are extremely rare. It is important that they be differentiated from malignant gliomas, as total surgical resection can be curative in some cases. *Methods:* A 10 year old boy presented with a 6 week history of progressive headache, nausea, vomiting, and weight loss. Severe papilledema with loss of visual acuity was noted. Magnetic Resonance Imaging revealed a 10cm heterogeneous mass in the right frontal lobe with cystic areas and patchy enhancement with gadolinium. *Results:* A gross total resection was achieved. Pathological and immunohistochemical stains displayed the glioneuronal nature of this tumour. *Conclusion:* Awareness of this new subgroup of glioma is important, and may account for long-term survival after surgical resection.

P-158

L'astrocytome granulaire : à propos d'un cas

N Marcotte (St-Émile, Québec), C Picard (Québec)*

Documentation de base: Une patiente s'est présentée pour des paresthésies progressives du membre supérieur gauche. Une résonance magnétique cérébrale démontra une lésion occupant l'espace frontale droite. La nature profonde de cette lésion ayant l'apparence radiologique d'un lymphome, une biopsie fut réalisée. Le diagnostic d'un astrocytome granulaire fut posé. *Méthodes:* Une revue de la littérature Pubmed et Medline fut réalisée afin de répertorier les données cliniques, radiologiques et pathologiques à propos de cette pathologie. *Résultat*: L'astrocytome granulaire est une pathologie cérébrale très rare. Seulement 22 cas sont rapportés dans la littérature. Une série de cas expose les données cliniques, pathologiques ainsi que radiologiques à propos de l'astrocytome granulaire. Nous comparons les données de la littérature à celles de la patiente en question et établissons un portrait global de cette pathologie. *Conclusion:* Une controverse émerge quant à la prise en charge de ce type de pathologie : l'astrocytome granulaire peut contenir des éléments de bas grade seulement en pathologie, tel est le cas pour cette patiente, mais évoluer de façon clinico-radiologique comme un astrocytome de haut grade. Ainsi, l'utilisation de chimiothérapie en première ligne, tel le Témodal, est controversée.

P-159

Effect of radiotherapy on seizure control in patients with low-grade glioma

N McLaughlin (Montreal), R Moumdjian (Montreal), F Berthelet (Montreal), J Bahary (Montreal)*

Introduction: The efficacy of radiotherapy on seizure control in patients with low-grade gliomas (LGG) is a relevant question since seizures are common in this population and anticonvulsive treatment is often unsuccessful with side effects. *Methods and material*: Retrospective review from 1995-2002 of patients presenting with epilepsy due to supratentorial LGG diagnosed according to Daumas-Duport criteria and adjuvantly irradiated. The Engel outcome classification assessed epilepsy reduction. *Results:* Twenty-three patients presented either ≥ 2 seizures within the past year (54.2%) or medically intractable epilepsy (45.8%). Biopsy was performed in 16 and resection in 8 patients. Histopathology documented astrocytomas (26%), oligoastrocytomas (48%) and oligodendrogliomas (26%). At discharge all patients were on anticonvulsive medication and received adjuvant radiotherapy. Follow-up varied between 17-76 months. Overall, 59% were free of disabling seizures. A reduction of > 90% of seizure frequency was observed in 87.5% (7/8) of patients that underwent tumor resection and 92.9% (13/14) of those biopsied. Two patients were not significantly improved. *Conclusion:* In this study population, radiotherapy reduced seizure frequency as effectively as tumor resection. This represents an argument favoring radiotherapy for inoperable LGG and might suggest that surgical resection might not be warranted for seizure control in this population.

P-160

Development of new fMRI tools for neurosurgical planning in patients with brain tumours invading the frontal lobes

P Kostopoulos (Montreal), C Amiez (Montreal), A Champod (Montreal), R Del Maestro (Montreal), M Petrides (Montreal), J Doyon (Montreal), L Collins (Montreal)*

The objective of this study is to develop new pre-operative neuroimaging tools for the assessment of high-order frontal functions in patients with brain tumours near the ventrolateral prefrontal cortex.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

The ventrolateral prefrontal cortex that encompasses the pars triangularis and pars orbitalis of the inferior frontal gyrus is critical for the disambiguation and active retrieval of information in memory. We developed an active retrieval task that taps onto the function of this region. We then used fMRI (Functional Magnetic Resonance Imaging) in three patients with brain tumours invading the frontal lobes to localize functional regions surrounding the tumour that were involved in the task. The pre-operative fMRI revealed peaks of activity differences surrounding the tumour site in all three patients. In patient PI one peak was dorsal to the tumour, in patient RP two peaks were dorsal and anterior to the tumour, and in patient MB three peaks were caudal, lateral, and anterior to the tumour. With the help of a neuronavigation system the neurosurgeon used this information to plan the neurosurgery and to determine the safest surgical route for the tumour resection of each patient. The results suggest that this procedure is of great clinical value.

P-161

Primary Leptomeningeal Gliomatosis: A review of two cases complicated by histopathological misdiagnosis

M SuttonBrown (Calgary), E O'Ferrall (Calgary), C Dunham (Calgary), W Fletcher (Calgary)*

Background: Primary leptomeningeal gliomatosis (PLG) is a rare malignant glial infiltrate of leptomeninges without a primary tumor. It presents with cranial neuropathies, meningitis, hydrocephalus, seizure, myelopathy, or non-specific headache. We report two young cases of PLG in which histopathological examination of meningeal biopsies was misleading. *Methods:* Case reports. *Results:* Case 1: A 39-year-old woman developed a partial third nerve palsy with a nonreactive pupil. Angiography was normal. MRI revealed an enhancing mass along the right third nerve from midbrain to cavernous sinus. Serial CSF studies showed elevated protein levels with normal cytology. Serial exams and MRI showed progressive involvement of cranial nerves. Leptomeningeal biopsy showed non-specific inflammation. She died a year later without a diagnosis. At autopsy, the lesion was examined using a GFAP stain, which revealed the diagnosis of PLG. Case 2: A 38-year-old woman presented with diplopia and monocular vision loss due to a third nerve palsy and optic neuropathy. MRI revealed irregular multifocal enhancing lesions along the basal leptomeninges, involving the optic chiasm and third nerves. Leptomeningeal biopsy was interpreted as showing non-specific granulomatous inflammation. Her neurologist requested additional staining with GFAP, which revealed PLG. She showed no response to radiation or corticosteroid therapy and died within a year. *Conclusions:* PLG may present as painful cranial neuropathies. The diagnosis is difficult and PLG is often misdiagnosed on biopsy. Our experience and previous case reports suggest that, in patients with leptomeningeal lesions, PLG should be considered in the differential diagnosis and biopsies should be examined routinely with GFAP stains.

P-162

Papillary tumor of the pineal region as an emerging distinctive entity: a case report

H Khuong (Quebec City), G Lapointe (Quebec City), P Gould (Quebec City), C Picard (Quebec City)*

Objectives: To present a case of a patient with a papillary tumor of the pineal region and to review the current literature available on this emerging pathology. *Methods*: A 23-year-old female presented with headache as a single symptom. The neurological exam was strictly normal. A CT scan and a MRI were performed and demonstrated hydrocephalus and a large pineal mass, which was believed to be a pineocytoma. *Results:* We performed an occipital and sub-occipital craniotomy. The pineal mass was entirely resected by a sub-tentorial approach. The patient underwent full recovery without any neurological deficit. The diagnosis of a papillary tumor of the pineal region was made locally and confirmed with further laboratory testing by the University of Rochester pathological team. *Conclusion*: Papillary tumors of the pineal region are rare and few cases have been published to this day. We present another case with features similar to those previously described. The natural evolution is thought to be quite similar to ependymal or choroid plexus tumors. Therefore a follow-up is mandatory.

P-163

Peripheral Primitive Neuroectodermal Tumor of the Cavernous Sinus: Case Report

N Attabib (Winnipeg), M West (Winnipeg)*

Background: Ewing sarcoma/peripheral primitive neuroectodermal tumors (ES/pPNET family) are small round blue cell tumors that have a decided predilection for young patients and commonly arise in bone and soft tissue .We are reporting a rare case of cavernous sinus pPNET in a 48 year old female patient. *Method:* A 48 year old female presented with headache, ipsilateral maxillary, ophthalmic and oculomotor nerve palsies. Neuroimaging revealed a cavernous sinus lesion.The patient underwent debulking of the tumor and the diagnosis of a peripheral primitive neuroectodermal tumor (pPNET) was made based on histological, immunohistochemical and molecular genetics (EWS-FLI1 fusion gene) findings .Bone scan, bone marrow aspiration and biopsy and chest CTscan showed no evidence of systemic involvement .The patient had adjuvant treatment with radiotherapy and chemotherapy. *Results:* After 14 months the patient had no neurological deficits and neuroimaging showed stable disease, although some chemotherapy complications occurred *Conclusion:* This is a case of cavernous sinus pPNET in a 48year old female where the diagnosis is supported by the presence of EWS-FLI1 fusion gene. This appears to be the first reported case of a cavernous sinus pPNET confirmed with Molecular genetic analysis

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-164

Downregulation of XRCC3 results in decrease in growth rate in glioma cell lines

Z Xu (Montreal), G Mohr (Montreal), L Panasci (Montreal)*

Background: Glioblastoma multiforme, the most malignant form of brain tumor, is typically resistant to alkylating agents, suggesting DNA repair by homologous recombination (HR) is involved in the DNA damaging agent resistance. The Rad51-guided HR repair system plays an important role in the recognition and repair of DNA interstrand crosslinks (ICLs), and cells deficient in the repair pathway become hypersensitive to ICL-inducing agents such as cisplatin. Previous study of x-ray repair cross-complementing protein 3 (XRCC3) indicated that XRCC3 induces cisplatin resistance by stimulation of Rad51-related recombinational repair, S-phase checkpoint activation, and reduced apoptosis. We investigate the role of XRCC3 in DNA repair in glioma cell lines. *Methods:* we utilized small interfering RNA technique to knock down XRCC3 protein expression in glioma cell lines, T98G and SKNSH. HR repair proteins were investigated by determining the levels of Rad51, Xrcc3, Rad51C, p53, p21 H2AX, and Chk1,2 proteins and the growth rate of aforementioned cell lines was detected by use of the sulforhodamine assay. *Results:* Protein expression of XRCC3 in both glioma cell lines was significantly down-regulated as evidenced by western blotting assay. The growth rate of XRCC3-siRNA treated cell lines is decreased as compared with mock cell lines. Protein expression of p21 is increased with the time after XRCC3-siRNA treatment consist with a role in repairing double-strand breaks (DSBs) that occur naturally. *Conclusion:* we propose that XRCC3 plays an important role in repairing DSBs in vivo. And it might be a good candidate in the glioma chemotherapy.

P-165

Cerebral metastasis of transitional cell carcinoma from orifice of ureter: case report

D Simonyan (Quebec), P Gould (Quebec), L Cantin (Quebec)*

Background: Brain metastases from bladder cancer are rare while the systemic disseminations occur frequently. The incidence of the metastasis has increased because of longer survival (chemotherapy). Metastatic diseases prognosis is poor and there is no consensus in treatment. We report our experience of surgical treatment for a single brain metastases from transition cell carcinoma (TCC) of the bladder. *Methods/Results:* A 62-year-old man developed right hemiparesis and deterioration of mental status in December 2004. Since 1996, he underwent numerous surgical procedures for recurrence of a papillary TCC of the bladder and chemotherapy. CT and MRI-scan showed a single juxta-cortical lesion of the left occipito-parietal region. Surgery was performed via a left parietal craniotomy and the lesion was totally resected as confirmed by post-op MRI. Histological diagnosis was of brain metastases of bladder TCC. The patient underwent whole-brain XRT post-op. Follow-up after 9 months revealed a recurrence of the tumor in the adjacent leptomeningeal space. The patient declined any further chemotherapy and died in 10 months post craniotomy. *Conclusion:* Treatment options are limited for this rare type of metastasis. This case report confirms the poor prognosis of such a disease despite multidisciplinary approach.

P-166

Pituitary macroprolactinoma in a patient presenting with features of Kleine-Levin syndrome

R Reid (Halifax), D Clarke (Halifax), B Wheelock (St.John), A Imran (Halifax), E Ur (Halifax), A McGibbon (Fredericton)*

Background: Male patients with macroprolactinomas usually present with headache, visual disturbance and decreased libido. We present a unique case of a patient with a macroprolactinoma who presented with a symptom complex having the features of Kleine-Levin syndrome, a rare neurological disorder characterized by cognitive and behavioral changes as well as periodic hypersomnia. *Methods:* Our patient was a 49 year old male who presented with a several month history of periodic hypersomnia, hypersexuality, hyperphagia, memory disturbance and derealization. CT and subsequent MRI imaging showed a large enhancing base of skull lesion extending superiorly to elevate the hypothalamus, laterally into the middle temporal fossae and inferiorly to C1 with boney erosion of much of the skull base. Serum prolactin level on presentation exceeded 46,000. *Results:* The patient was started on oral bromocriptine for treatment of his pituitary macroprolactinoma and, with normalization of his serum prolactin level over the next few months, his symptoms completely resolved. With shrinkage of the tumor, he developed a spontaneous CSF rhinorrhea which was repaired surgically, and decreased libido which was treated with hormone replacement. *Conclusions:* We report a patient whose symptoms of Kleine-Levin syndrome completely resolved with successful treatment of his macroprolactinoma.

P-167

Methylation Status in the ERCC1 and ERCC2 Promoter in Glioma Cell Lines vis-à-vis Anti-cancer Drug Resistance

Z Chen (Guangzhou), H Chen (Guangzhou)*

Background: We previously demonstrated a correlation between alkylating agents resistance and the expression of excision repair cross-complementing rodent repair deficiency gene 2 (ERCC2), while ERCC1 overexpression has been known related with platinum-resistance, and both ERCC2 and ERCC2 are the important components in nucleotide excision repair (NER) system. It has been proved that methylation of the CpG island in the promoter region is associated with silencing of the genes. *Methods:* In this study we have analyzed methylation status in the ERCC1 and ERCC2 promoter using bisulphate sequencing, and compare with anti-cancer drug resistance to MeCCNU and cisplatin which were determined by MTT assay in five glioma cell lines, UW28, MGR1, MGR2, SF767 and T98G. *Results:* Our results revealed that methylated CpG island in the 4.9Kb region of ERCC1 gene promoter upstream in the platinum-sensitive cell lines SF767 MGR2, while in the resistant cell lines UW28, T98G and MGR1 have not be found. The putative CpG island of ERCC2 promoter showed the ummethylated status in all five MeCCNU-resistant cell lines.*Conclusions:* Our primary data indicate that aberrant methylation status of ERCC1 and ERCC2 were associated with chemosensitivity in gliomas cell lines. Key words: ERCC1, ERCC2, Nucleotide excision repair, Drug resistance, Glioma.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

SPINE

P-168

Equestrian-related Spine and Spinal Cord Injuries

A Szymczak (London), W Ng (London)*

Introduction: Horseback riding is a potentially dangerous sport. Horses are large and often unpredictable animals that can weigh up to 1500 pounds and can attain speed of up to 65 km/hr. Equestrian-related spinal injuries often result in permanent neurological deficits and therefore warrant closer investigation.The purpose of this study is to determine the mechanisms and patterns of spinal injury associated with equestrian activity. *Methods:* A retrospective review of 4 cases of equestrian-related spine and spinal cord injuries admitted to the London Health Sciences Center was performed. *Results:* All 4 female patients are experienced leisure riders aged 22 to 44 years old. All were thrown from their horse while travelling at high speed. All sustained spinal cord injury and spinal column fractures (cervical spine in 3 patients, thoracolumbar spine in 1). The last patient, after having fallen, was crushed by the horse, resulting in the fracture. Three out of the 4 patients required definitive surgical fixation. *Conclusions:* A fall from a galloping horse is the commonest mechanism of spinal injury. This study illustrates that riding experience does not protect the rider from spinal injury. Continued safety education for all horse riders is strongly recommended.

P-169

Minimally invasive surgical resection of extradural lumbar dumb-bell nerve sheath tumors using METRx tubular retractors

A Cenic (Hamilton), L Crevier (Hamilton), N Murty (Hamilton), K Reddy (Hamilton)*

Background: Nerve sheath tumors represent approximately 25% of spinal cord tumors. Treatment of these benign tumors is complete surgical excision. Resection is usually accomplished with open posterior/posterolateral approach. However, with the advent of microendoscopic tubular retractor systems, such tumors may be resected using such minimally invasive techniques. To date there have been no reports of the use of tubular retractor systems in the excision of extradural nerve sheath tumors. *Methods:* Large lumbar extradural nerve sheath tumors in 2 patients were resected using the minimally invasive microendoscopic METRx-Quadrant tubular retractors through small posterior paraspinal percutaneous incisions. *Results:* Both patients presented with low back and unilateral radicular leg pain, and MRI confirmed the presence of extradural lumbar nerve sheath tumors. Patient A (61 year old female) had a left L5-S1 dumb-bell schwannoma completely resected using a small 2 cm posterior percutaneous incision just off midline. She was discharged home the next day with resolving symptoms. Patient B (27 year old male with Neurofibromatosis) had a right extradural L1-L2 malignant nerve sheath tumor grossly excised with a similar posterior approach. He was discharged home on post-operative day 3 with improved radicular symptoms. For both patients, there were no intraoperative complications, blood loss was less than 500 ml, and PCA was not required postoperatively. *Conclusions:* We have shown that gross total resection of extradural nerve sheath tumors using microendoscopic tubular retractor systems may be a suitable alternative approach to traditional open laminectomy and facectomy. Using such a minimally invasive procedure, hospital stays may be shortened, intraoperative blood loss reduced, and use of post-operative narcotics diminished.

P-170

Repair of anterior sacral meningocele: A technical note

F Maroun (St. John's), R Avery (St. John's), J Jacob (St. John's), G Murray (St. John's), A Engelbrecht (St. John's), E Walsh (St. John's), B Cramer (St. John's), A Pickles (St. John's)*

Background: Though rare, the surgical repair of anterior sacral meningocele with or without Marfan's syndrome, can be difficult. Several surgical approaches have been described. We present an additional simple technique of closure of the dural fistula. *Methods:* A 15 year old girl presented with a one year history of progressive lower limb weakness and urinary incontinence due to large anterior meningocele with partial sacral agenesis and thethered cord. Through sacral laminectomy and after untethering the filum, the dural communication was closed using mobilization and rotation of the empty sacral dura anchoring it to the lowest edge of the anterior dura followed by a posterior allodura graft. The remnant of the sacral dura was secured to the edge of the muscle surrounding the pelvic opening. *Results:* Complete obliteration of the dural communication was achieved with continuing clinical improvement. *Conclusions:* The difficulties in identifying the exact communication of the dural arachnoid defect have led to several surgical treatment modalities. The present technique appears simple and was successful in our patient.

P-171

Goretex surgical membrane placement may accelerate re-tethering following repair of spinal dysraphism

Y Kalache (London), K Hoogheim (London), A Ranger (London)*

Background: Tethered spinal cord syndrome is a common complication following repair of spinal dysraphism. Efforts to reduce the incidence of re-tethering have included the insertion of a Goretex membrane below the dura during closure. We report four patients who required reoperation for early retethering (within one year) due to dense adhesion formation to the Goretex sheet itself. *Methods:* Four unrelated children with a history of myelomenigocele repair at birth presented to our center with syptomatic spinal cord tethering. Tethered cord release was carried out on each child, with the insertion of a Goretex surgical membrane at the repair site. Each child experienced a transient improvement in tethered cord symptomatology, but all eventually presented within one year with recurrent symptoms, requiring reoperation. *Results:* At reoperation, all patients were found to have dense adhesion formation involving the Goretex sheet and intradural structures, with obvious cord re-tethering. Duration of surgery in each case was increased and in one patient, only a partial untethering could be accomplished. This patient did not recover beyond the preoperative baseline, but the others did improve clinically. In all patients, the graft material was removed entirely. *Conclusions:* We would discourage the use of Goretex

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

interposition sheet placement. These cases suggest that the use of Goretex may actually accelerate the rate of retethering, leading to more difficult surgery and increased postoperative morbidity.

P-172

Metastatic spinal paraganglioma: case report and literature review

A Cenic (Hamilton), N Murty (Hamilton), E Kachur (Hamilton)*

Introduction: Paragangliomas usually present as neoplasms of the aorticosympathetic chain, carotid, vagal, jugulotympanic bodies and cauda equina. Spinal metastasis is extremely rare. We present such a case with a review of the literature on spinal metastatic paragangliomas. *Methods:* A 27 year old male who had a carotid body paraganglioma resected 6 years previously presented with a 4 month history of flank pain and perianal numbness with constipation and urinary frequency. Spinal MRI revealed lesions at T11-12 and S1 with significant neural compression. Metastatic lesions were also seen throughout the spine, lungs and skull. *Results:* The patient underwent a posterior S1-2 decompression as well as an anterior lateral approach with instrumentation and fusion at T11-12 for tumor removal on separate settings. Major blood loss was encountered during the thoracic surgery. From the very few cases presented in the literature, multiple modalities as treatment options including surgery, radiation and chemotherapy have been proposed. Prognosis varies from months to several years. *Conclusion:* The literature does not provide a consensus on treatment nor prognosis. These metastatic lesions are highly vascular and pre-operative embolization is recommended. Further information to develop ideal treatment plans is required.

P-173

Paraganglioma of the Filum Terminale: MRI and angiographic features

M Nikolakis (Edmonton), R Heran (Vancouver), M Boyd (Vancouver)*

Background: Paraganglioma of the filum terminale or cauda equina is a rare tumor arising from the extra-adrenal paraganglia. We report the case of a 46 year-old male with a six year history of progressively worsening back pain and no neurological deficit. MRI of the lumbar spine revealed a large intra-dural extra-axial tumor extending from L1 to S1. Angiography of the lesion revealed a large feeding vessel arising from the Artery of Adamkieweicz. Surgical resection was performed, and pathology was diagnostic for paraganglioma. We performed a review of the literature, with emphasis on the MRI and angiographic characteristics of this tumor. To our knowledge, we are the first to report the angiographic features of a paraganglioma of the filum terminale. *Methods:* Both Medline and PubMed were searched with the MeSH terms Paragaglioma AND (filum terminale or cauda equina). All relevant articles were used for reference of this poster. *Findings:* To date, only 80 cases of paraganglioma of the lumbar spine have been reported in the literature. MRI features include hypo- or iso-intensity on T1-weighted images and hyperintensity on T2-weighted images, with marked homogenous enhancement upon contrast administration. Serpentine vessels may be seen arising from the region of the conus medullaris. The main radiological differential diagnosis includes ependymoma, meningioma and solitary metastasis. We also report the angiographic features of this tumor, which includes a large feeding vessel arising from the artery of Adamkieweicz. This feeding vessel was found intra-operatively and its ligation significantly reduced the rate of bleeding from the tumor during resection. *Conclusion:* Paraganglioma of the filum terminale is a rare tumor arising from the extra-adrenal paraganglia. The MRI characteristics are non-specific, but the presence of large flow voids arising from the region of the conus medullaris should raise the possibility of a paraganglioma. We are the first to describe the angiographic features of this tumor.

P-174

Anterior Odontoid Screw Fixation for Type II Odontoid Fracture in Patients Older than 50 Years

W Ng (London)*

Background: Non-operative management of Type II odontoid fracture is associated with high non-union rate (35-50%), especially in patients older than 50 years with posteriorly displaced fracture. Surgical treatment includes anterior odontoid screw fixation or posterior C1-C2 fusion. *Methods:* A retrospective review of 14 patients older than 50 years with Type II fracture treated with anterior odontoid screw fixation was conducted. *Results:* There were 4 males and 10 females with a mean age of 72.9 years (range of 51-93 years). Ten patients had posterior displacement with a mean of 4.6 mm (2-7mm). Single screw was inserted under fluoroscopic guidance. All patients wore a hard C-collar for 8 weeks after surgery. Post-op flexion and extension C-spine x-ray and CT scan were used to determine fusion. Mean post-op follow-up was 24.2 months (5-40 months). Fusion rate was 92.8% (13 out of 14 patients). The screw backed out in the non-fused patient resulting in transient dysphagia and repeated surgery for screw removal and posterior C1-C2 fusion. *Conclusions:* Anterior odontoid screw fixation is a surgical treatment option in Type II fracture in patients older than 50 years.

P-175

Fatty filum terminale with tethered cord syndrome presenting as acute neurological deterioration-a review of 2 cases

T Sankar (Edmonton), V Mehta (Edmonton)*

Background: Fatty filum terminale is a spinal dysraphic state characterized by a filum lipoma >2mm thick, thought to result from defective retrogressive differentiation of the caudal cell mass. Fatty filum typically presents as the tethered cord syndrome, characterized by a low-lying, dorsally displaced conus and the gradual onset of orthopedic, urologic, and neurologic symptoms. To our knowledge, acute neurological deterioration due to tethering by a fatty filum has not been reported. We present two such cases of acute deterioration requiring surgical untethering with subsequent neurological improvement. *Methods:* Case 1 is a 14 year-old girl who presented with a two-week history of recalcitrant, progressive leg and back pain after her left leg had been pulled. She developed progressive impairment of ambulatory and bladder function. Case 2 is a 3 year-old boy who suddenly developed back pain, leg pain, and progressive inability to ambulate following cardiac surgery. *Results:* MRI in both cases demonstrated a fatty filum and low-lying conus. Tethered cord release via intradural filum resection was performed urgently in each

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

case, with post-operative improvement in neurologic function *Conclusions:* Tethered cord syndrome due to fatty filum terminale can rarely present as acute neurological deterioration, reversible with urgent surgical untethering.

P-176

The Use of C1 Lateral Mass Screws in Complex Cervical Spine Surgery: Indications, Techniques, and Outcome in a Prospective, Consecutive Series of 25 Cases

T Gunnarsson (Toronto), E Massicotte (Toronto), P Govender (Toronto), Y Rampersaud (Toronto), M Fehlings (Toronto)*

Background: Transarticular screw fixation has been associated with the greatest biomechanical stability and high fusion rates in instrumented fusion of C1-C2. An alternative method is to insert screws separately into the lateral mass of C1 and into pars interarticularis of C2 with an intervening rod connection. We report our initial experience with this technique in a consecutive series of 25 patients. *Methods:* A prospectively accrued database was reviewed to determine initial presentation, etiology, operations, complications, and clinical/ radiological outcomes. *Results:* There were 14 male and 11 female, mean age of 56 (range 14-83). Clinical and imaging follow up was available for all patients (mean 12 months, median 12 months). The most common presentation was neck pain followed by spinal cord dysfunction. In one case, the C1 screws breached the medial cortex without any neurological sequelae. Three patients developed post-operative C2 neuralgia. No other intra- or post-operative complications were associated with this technique. *Conclusion:* Based on our experience, proficiency with the use of both C1 lateral mass and C1-C2 transarticular fixation greatly improves the ability to achieve biomechanical superior fixation at C1 and C2 in a greater number of patients with low morbidity and no mortality.

P-177

Traumatic cervical spondyloptosis: case report and literature review

E Frangou (Saskatoon), G McLoughlin (Saskatoon), S Hentschel (Saskatoon)*

Background: Cervical spondyloptosis is a rarely described condition. The term spondyloptosis refers to the anterior spondylolisthesis of one vertebral body over another, such that the displaced vertebral body comes to rest anterior to the previously inferior vertebral body. There are only three reported cases of traumatic cervical spondyloptosis. *Methods:* A case of traumatic C6/C7 spondyloptosis in a 16 year old female is presented. A review of the indexed English literature was performed using Pubmed (search term: 'spondyloptosis'). *Results:* The patient presented with traumatic complete C6 quadraplegia. She underwent a combined posterior reduction with anterior and posterior stabilization following partial closed reduction. Her post-operative course was uncomplicated. At the time of discharge to a rehabilitation facility, her level of neurological injury did not change; she did, however, have partial recovery of C7 innervated musculature. The available cases of traumatic cervical spondyloptosis reported in English are reviewed and discussed. *Conclusions:* Unfortunately, there are very few reported cases to support clinical decision-making in the management of traumatic cervical spondyloptosis. The authors recommend a combined closed and open reduction along with anterior and posterior stabilization.

P-178

Pilocytic astrocytoma of the conus medullaris with exophytic cauda equina component: A rarely encountered spinal intradural tumor in children. Case report and review of the literature

Y Kalache (London), F Siddiqi (London), S Zelcer (London), G Baumann (London), K Hoogheim (London), A Ranger (London)*

Background: Childhood pilocytic astrocytoma is a benign nervous system tumor typically involving the posterior fossa, optic-hypothalamic apparatus, tectum or medulla. There are fewer than ten reported cases of occurrence within the conus medullaris in adults. This tumor location has not been reported in children. We report a 14 year old girl with such a lesion. *Method:* A healthy, athletic 14 year old girl presented with a 6 month history of back pain and a two week history of difficulty voiding. She had acute urinary retention at presentation and bilateral L4-S4 motor disturbance. MRI imaging demonstrated a complex non-homogeneously enhancing lesion expanding the conus and extending into the spinal canal. *Results:* At surgery, T9 through L4 laminectomies revealed an expanded, distorted and discolored conus, completely transformed by tumor. The cauda equina roots were matted together, clumped dorsally, and surrounded by thick, gelatinous, grey-pink tumor of low vascularity. A cyst containing thin amber fluid at L3 was aspirated. Intraoperative pathology suggested low grade astrocytoma, later confirmed to be pilocytic astrocytoma. SSEP and MEP remained unchanged during resection. Post operative imaging showed residual tumor within the conus. The patient went on to receive adjuvant spinal radiotherapy. *Conclusions:* The lower spinal canal is a rare location for pilocytic astrocytoma. Although histologically benign, the poor resectability of tumors in this location and small numbers in the literature make long-term outcome difficult to predict.

P-179

Intradural spinal tumour of mixed paraganglioma and myxopapillary ependymoma histology

J Keith (London), S Lownie (London), L Ang (London)*

A thirty-eight year old woman presented with pain in her tailbone. The pain was worse on the left, and radiated to the hip, posterior thigh, and posterior calf. She also had a single episode of urinary incontinence. Neuroimaging (MRI) demonstrated an intradural tumour at the level of L4. The lesion was resected, and the intra-operative impression was that there were two separate lesions, both arising from the filum terminale. Histologically, the larger lesion was a paraganglioma, and the smaller lesion a myxopapillary ependymoma. The occurrence of simultaneous paraganglioma and myxopapillary ependymoma has been previously reported on one occasion (Caccamo, D.L. et al (1992) Human Pathology, 23(7): 835), and is an interesting occurence as it fuels the discussion surrounding the cell of origin of these lesions. The neuroimaging, gross and histological features of this case will be discussed in the context of the literature, and implications of this case for the proposed pathogenesis of these tumours will be illustrated.

P-180

Multilevel Thoracic Stenosis Secondary to Ossification of the Ligamentum Flavum in a Caucasian Female

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

Background: Ligamentum Flavum Ossificans is a well described entity in Southeast Asian and Japanese populations, but is very rare in Caucasians. In females, this disorder is even more unusual, and involves primarily the cervical spine. *Methods:* The authors describe a 53 year old woman with a several year history of progressive pain, numbness and weakness of the lower extremities. Magnetic resonance imaging and a CT scan with sagittal reconstructions revealed significant ossification of the ligamentum flavum throughout the entire thoracic spine. *Results:* Surgical decompression and stabilization of the affected region with instrumented fusion resulted in significant improvement of symptoms and a good functional outcome at 6 months. Histopathological examination confirmed that the lesion was indeed ligamentum flavum with dense ossification. *Conclusions:* Ossification of the ligamentum flavum should be considered in patients presenting with insidious symptoms of spinal cord compression. T2-Weighted MRI and CT sagittal reconstructions of the spine were instrumental in making the diagnosis and in operative planning. This is the first described case of thoracic OLF in a Caucasian female.

P-181

Characterization of soluble Fas receptor as a neuroprotective agent following spinal cord injury

S Robins (Toronto), M Fehlings (Toronto)*

Background: The pathophysiology of SCI consists of a primary mechanical insult that triggers a secondary cascade of cellular damage. A key event in this pathology is delayed apoptotic cell death, leading to progressive neurodegeneration. Several molecular pathways have been attributed to apoptosis after SCI. The Fas receptor pathway plays an integral role in the initiation of apoptosis through receptor-ligand binding and has been observed after CNS trauma and in several neurodegenerative diseases. We hypothesize that inhibition of the Fas receptor pathway is neuroprotective in the acutely injured spinal cord. *Methods:* In this study, we used a 35g and 50g clip compression injury model at C7-T1 followed by intrathecal adminstration of sFasR using osmotic minipumps. We used western blots of NF200 and CNPase, and immunohistochemistry showing TUNEL staining and cell-specific markers to evaluate the efficacy of sFasR administration. *Results:* At 5 and 7 days following injury, our results reveal enhanced axonal preservation, enhanced survival of oligodendrocytes and a reduction in apoptotic cell death in sFasR treated animals compared with controls. *Conclusions:* Disruption of the Fas pathway in acute SCI can lead to enhanced axonal and tissue preservation, which mirrors well with the improved long-term recovery observed previously in our lab. Moreover, this work shows the potential of soluble Fas receptor administration to be a therapeutic option for individuals suffering from acute SCI.

P-182

Annuloplasty to Prevent Recurrent Disc Herniation

B Jhawar (Windsor), V Kokavec (Windsor), R Chawla (Windsor), N Liem (Windsor), P Oldfield (Windsor)*

Introduction: Recurrent disc herniation is a common problem that plagues 3-19% of patients undergoing lumbar discectomy. We present a simple technique that may reduce the incidence of this problem. *Method:* After exposure of the disc space, the lumbar disc annulus is opened in a "trap-door" manner. After discectomy and curettage the annulus is primarily closed with a fine non-absorbable suture. This modification typically adds five-minutes to the procedure. We believe that his method should reduce the incidence of recurrent disc herniation. A randomized-trial protocol will be presented where we estimate the sample size requirements to be 320 patients (80% power; p=0.05; to reduce the incidence from 15% to 5%). Preliminary data from a consecutive series will also be presented. *Conclusion:* This simple modification to the lumbar discectomy procedure may reduce the incidence of recurrent disc herniation, but proper evaluation is required. A randomized-trial is proposed.

P-183

Surgical reconstruction for metastatic spinal disease: a report on 16 cases

M Lacroix (Quebec)*

Background: Surgical treatment of spinal metastases has long been controversial. Recent class one evidence have shown the net benefit of reconstructive surgeries and radiation therapy when compared to radiation therapy alone. We report our experience in our institution with sixteen cases of reconstructive surgery for spinal metastases. *Methods:* Retrospective study of demographic, ASIA and Frenkel score, spinal segment involvement, pathology and outcome analysis of sixteen patients with spinal metastases requiring reconstructive surgery treated in our institution. *Results:* Mean age: 63 years old- 9 women and 7 men. All spinal segments were represented. One to three corpectomies with instrumented reconstruction and stabilization were performed. All patients received local radiation therapy. All patients maintained or gained neurologic function post-op, walking capacity, decreased analgesics and steroid medical treatment. Complication of surgery included one cerebro-spinal fluid leak and one neuropathic pain which resolved after treatment. *Conclusion:* Reconstructive surgery for spinal metastases followed by radiation therapy is an effective treatment to maintain neurologic function and improve quality of life.

P-184

Surgical Treatment of Discitis and Osteomyelitis: Report on Seven Cases

M Lacroix (Quebec), G Lapointe (Quebec), N Marcotte (Quebec), D Mercier (Quebec)*

Background: Surgical treatment of spinal discitis and osteomyelitis is only necessary when secondary instability threatens neurological structures and spinal alignment. We report our experience with seven cases of spinal discitis and osteomyelitis

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

surgically treated. *Methods:* Retrospective study of demographic, ASIA and Frenkel score, spinal segment involvement, pathology and outcome analysis of seven patients with spinal discitis and osteomyelitis requiring reconstructive surgery treated in our institution. *Results:* Mean age: 53 years old-all males; one patient was diabetic. The source of infection was identified in half of them. Of all discitis, six were cervical or cervico-thoracic, one was mid-thoracic. All patients underwent two corpectomies, three discectomies, anterior reconstruction and posterior stabilization. All patients maintained neurological function. There were no surgical complications. *Conclusion:* Surgical treatment of unstable spinal discitis and osteomyelitis carries low morbidity and allows preservation of neurological function.

P-185

Controversies in the treatment of asymptomatic adult patients with Chiari 1 malformation and syringomyelia

R Reid (Halifax), D McNeeley (Halifax), M Hadley (Birmingham)*

Background: Chiari 1 malformation with syringomyelia is a condition occasionally found in patients being investigated for symptoms seemingly unrelated to these imaging findings. The natural history of this condition is not completely understood, however there are several case reports in the pediatric literature suggesting that complete resolution of these imaging findings may occur spontaneously. The concern in adult patients is that worsening of the syringomyelia may lead to progressive, potentially irreversible neurological dysfunction. A posterior fossa decompression and duraplasty is sometimes recommended in order to correct the abnormal craniocervical CSF flow dynamics and thus correct the syringomyelia. Alternatively, expectant management can be offered with serial imaging and clinical follow-up. There is no consensus regarding the management of these patients. *Methods*: Two illustrative cases are reported, and a literature review is presented. *Results*: A review of two patients with asymptomatic Chiari 1 malformation and syringomyelia was preformed. One patient was treated operatively, while the other is being followed expectantly with both clinical and MR surveillance. The patient treated operatively has had an unremarkable course and follow up MR imaging reveals a reduction in the pre operative clinical syrnix. The other patient has been followed expectantly with clinical and imaging follow up and has remained unchanged. *Conclusion*s: The treatment of patients who present with asymptomatic Chiari 1 malformation and syringomyelia is controversial. Not infrequently Chiari 1 malformation and syringomyelia is seen on MR imaging of patients who were imaged for symptoms seemingly unrelated to this condition. The natural history of this condition is not fully understood and as a result no definitive treatment paradigm has been developed. Further study is needed to develop an effective management strategy.

P-186

Management of a traumatic spondylolisthesis of the axis in an eight week-old infant

F Lam (Edmonton), V Mehta (Edmonton), R Fox (Edmonton)*

Background: Pediatric spondylolisthesis of the axis (hangman's fracture) is rare and difficult to diagnose. Management of these fractures can be challenging due to non-compliance with orthoses and age-related limitations of surgical intervention. We present a case of a hangman's fracture in an eight week-old infant. *Methods:* A case report with eighteen month follow-up. *Results:* This infant presented with multiple injuries suspicious for non-accidental trauma. Skeletal survey x-rays revealed a badly displaced hangman's fracture without neurologic deficits. Further imaging confirmed this to be a Effendi type III injury with 3 mm of anterior slip. Initial management with a Philadelphia collar was well tolerated, and appeared to be effective at 4 weeks, and was continued for 3 months. However, on removal of the collar, he developed worsening anterior displacement of C2 on C3 and widening of the fracture gap. He was noted to have increased neck pain and was subsequently placed in a specialized "pinless" halo vest for 3 months, which provided satisfactory but incomplete reduction. Follow-up flexion/extension x-rays at 15 months showed the persistent anterolisthesis to be stable. The patient is assymptomatic. *Conclusion:* Badly displaced hangman's fractures in an infant can be managed successfully with external orthosis for prolonged periods, and that this "pinless" halo vest is well tolerated.

Stroke

P-187

Carotid Endarterectomy Hyperperfusion Syndrome

J Scozzafava (Edmonton), M Hussain (Edmonton), T Yeo (Edmonton), T Jeerakathil (Edmonton), P Brindley (Edmonton)*

Background: Cerebral hyperperfusion syndrome(CHS) is a potentially devastating complication of cerebral revascularization. The exact incidence of CHS is unclear. Estimates following carotid endarterectomy(CEA) range from 0.4-2.7%.1 Management requires aggressive blood pressure control to prevent stroke, and intracerebral hemorrhage. This case report documents a severe case of CHS and successful outcome with aggressive blood pressure control. *Case Report:* A 67-year-old gentleman, nine days post left CEA, required intubation and ICU admission following seizures and acute right-sided weakness. CT and MRI revealed significant vasogenic edema in the left middle cerebral artery territory, without evidence of infarction. The history and imaging suggested CHS. A systolic blood pressure target was set at 90-140mmHg, lower than typically targeted following acute ischemic or hemorrhagic stroke. Rapid clinical improvements were seen by day five. Tight blood pressure control was maintained throughout. Repeat imaging revealed improved edema and no evidence of infarct or hemorrhage. *Discussion*: CHS occurs following cerebral revascularization to brain with impaired autoregulation due to chronic hypoperfusion. Massive edema and hemorrhage can result. It's important for physicians to be aware of CHS and the importance of blood pressure targets that are considerably lower than for other patients with similar clinical presentations.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-188

Cerebral vasoconstriction syndromes: A case for brain biopsy

N Deshpande (Vancouver), M Heran (Vancouver), E Kavanagh (Vancouver), S Yip* (Vancouver)*

Background: The differential diagnosis for thunderclap headache associated with neurological deficits and angiographic abnormalities includes primary angiitis of the CNS (PACNS) and benign angiopathy of the CNS (BACNS). Pathogenesis, management and prognosis of these conditions differ considerably. We propose a role for brain biopsy in making a definitive diagnosis. *Methods:* Case report and literature review. *Results:* We present a 48 year old previously healthy woman who developed a sudden onset severe occipital headache during Valsalva maneuver. Two weeks later, she presented with Balint's syndrome and decreased vibration and proprioception. Imaging revealed bilateral parietal and occipital lobe infarcts and multiple luminal irregularities of the intracranial vessels. CSF studies were normal. Brain biopsy was requested, but denied. The patient was felt to have PACNS and started on high dose methylprednisolone, but continued to deteriorate until additional treatment with nimodipine. This raised the possibility of BACNS. *Conclusions:* PACNS and BACNS are not distinguished on the basis of angiography alone. Vasculitis carries a high mortality, while long-term immune suppression is associated with significant morbidity. Given the risks of leaving true vasculitis untreated or, conversely, of treating BACNS with long term immunosuppressants, we recommend brain biopsy for patients in whom there is any degree of diagnostic uncertainty.

P-189

Contrast-Enhanced MR Angiography Overestimates Carotid Stenosis Compared with 3D Time-of-flight MR Angiography and Digital Subtraction Angiography

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

Background: Contrast-enhanced MR angiography (CEMRA) has begun to replace time-of-flight MR angiography (TOFMRA), because it reduces imaging time and improves signal-to-noise ratio. However CEMRA might overestimate the degree of arterial stenosis. With digital subtraction angiography (DSA) as reference standard, we tried to find out if CEMRA overestimates carotid artery stenosis more than TOFMRA. *Methods:* From April, 2003 to August, 2005, fifty five consecutive patients underwent TOFMRA, CEMRA and DSA. The degree of stenosis was measured using NASCET method and classified as mild (1~49%), moderate (50~69%), and severe (70~99%). *Results:* Five patients were excluded because of the poor quality of images. In 100 carotid arteries of 50 patients, 8 arteries showed occlusion. CEMRA overestimated the severity of carotid stenosis in 8 out of 92 but TOFMRA did in 3 out of 92. We calculated the agreement by κ in CEMRA vs. DSA ($\kappa = 0.79$, $p < 0.05$) and TOFMRA vs. DSA ($\kappa = 0.92$, $p < 0.05$). For detection of severe stenosis, CEMRA had the sensitivity of 100% and the specificity of 90% while TOFMRA had 100% and 97.5% respectively. The rate of misclassification of patients as an appropriate candidate for carotid surgery was 40.4% in CEMRA and 14.8% in TOFMRA. *Conclusion:* CEMRA has many advantages over TOFMRA but it tends to overestimate the severity of carotid stenosis. The results of CEMRA should be compared with those of TOFMRA or DSA when surgical intervention is considered.

P-190

Hypertension in Acute Ischemic Stroke: Measuring Its Effect and Evaluating Medical Management

M Keezer (Montreal), R Cote (Montreal), B Zhu (Montreal), C Wolfson (Montreal)*

Background: Little data exist concerning the association between acute BP and functional outcomes including survival among acute ischemic stroke patients. *Methods:* We reviewed the records of patients admitted to the Montreal General Hospital between April 1, 2002 and November 11, 2004 with same day onset of ischemic stroke. Stroke was severe if the Canadian Neurological Scale at presentation was ≤7. Poor outcome at 10 days after onset was defined as a modified Rankin Scale >2 or death. The association between BP and the outcome was assessed using unconditional multivariable logistic regression. *Results:* The charts of 221 patients were reviewed. High mean arterial pressure (MAP≥140mmHg) at presentation was found to carry a decreased risk of poor outcome [OR=0.21(95% CI, 0.05-0.89)]. A ≥10% decrease between presenting MAP and mean day 1 MAP was also found to carry a decreased risk of poor outcome [OR=0.32(95% CI, 0.11-0.97)]. This finding remained statistically significant after accounting for age, initial stroke severity, diabetes, statin, anti-platelet and anti-hypertensive therapy. *Conclusions:* Higher MAP at stroke presentation as well as a MAP decrease during the first day of admission is associated with an improved outcome at 10 days after ischemic stroke onset.

P-191

Diagnostic and prognostic value of biological markers in asymptomatic carotid artery disease

E Ehrensperger (Montreal), J Minuk (Montreal), A Mackey (Quebec City), S Solymoss (Montreal), C Wolfson (Montreal), T Wein (Montreal), A Fontaine (Montreal), R Cote (Montreal)*

Background: Optimal management for individuals with asymptomatic carotid stenosis (ACS) remains unclear. There may exist a subgroup at higher risk for ischemic events. Inflammatory and hemostatic markers play a role in atherothrombosis and may help identify high-risk individuals thus justifying more aggressive preventive measures. *Methods:* Two groups of subjects are currently being recruited: 1-asymptomatic subjects with ACS≥50%, and 2-neurologically asymptomatic controls without significant carotid disease. All subjects undergo baseline and yearly evaluations, carotid ultrasound and determination of fibrinogen, D-dimers, prothrombin fragment F1.2, hsCRP, and Lp(a) levels. Patients are followed for up to 5 years for the occurrence of ischemic events and/or progression of carotid disease. *Results:* We are prospectively following 207 subjects. Mean age is 69.4 years. Hypertension, hypercholesterolemia, and heart disease are more prevalent in the ACS group. Mean fibrinogen level is significantly higher in the ACS group (4.20g/L vs 3.86g/L, p=0.017). Mean D-dimers levels are not significantly different. Analysis of the other markers is currently underway. *Conclusions:* Recruitment, follow-up and data analysis are presently ongoing. We hypothesize that the level of one or more markers will correlate with vascular risk factors, degree and/or progression of carotid atherosclerosis and potentially identify a subgroup at higher risk for ischemic events.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

P-192

The lone abducting eye syndrome with a lesion at the callosal genu

I Derakhshan (Charleston), S Reesman (Beckley)*

CG was a right handed woman. She presented with diplopia, trouble with balance and headache. Examination showed left internuclear ophthalmoplegia (INO), gaze preference to the right and nystagmus of the left eye on left lateral gaze. Although a lesion of the left medial longitudinal bundle was expected, the MRI showed recent small infarct at the genu of the callosum, hugging the lateral surface of the anterior horn of the right ventricle, and two other small lesions anterior to the motor strip of the left hemisphere. There were no lesions in the brainstem. Two weeks later MRI showed absence of the above-mentioned diffusion weighted abnormalities and appearance of new ones elsewhere, indicating an embolic process. The diplopia and nystagmus improved in time as did the INO. This case represents the laterality indexed syndrome of Lone Abducting Eye, first described by JE Simon et al as a CT finding. It confirms the excitatory nature of callosal signals of the major hemisphere on the minor and on down to the pontine centers involved in horizontal eye movements. Eye movement video and MRIs will be presented. Derakhshan I. How do the eyes move together? New understandings help explain eye deviations in patients with stroke Can. Med. Assoc. J., 18, 2005; 172: 171 - 173.

P-193

Fibromuscular dysplasia with carotid artery dissection presenting as isolated hemianopsia

A Poppe (Montreal), J Minuk (Montreal), M Leventhal (Montreal), R Glikstein (Montreal)*

Background: Internal carotid artery (ICA) dissection is a well-known cause of anterior circulation stroke, but its association with isolated posterior circulation stroke has been less commonly reported. The latter situation can arise when there is persistent fetal circulation of the posterior cerebral artery (PCA) and has, to our knowledge, never been reported in the setting of fibromuscular dysplasia (FMD) involving the ICA. *Methods:* A 52-year-old man awoke with severe headache and noted visual loss. Examination confirmed a congruous left homonymous hemianopsia. A head CT revealed an acute right posterior parietal infarct. Carotid ultrasonography demonstrated complete occlusion of the right ICA. Conventional angiography confirmed this and was diagnostic of FMD. A right-sided persistent fetal circulation was also noted. MRI revealed right parietal and right occipital infarctions. *Results:* The patient received ASA and clopidogrel and his visual deficit resolved within days. One year later, he remains asymptomatic and there is no suggestion of FMD in other vascular beds. *Conclusions:* Although infrequently reported, carotid disease, including dissection, can be responsible for isolated posterior circulation infarcts. Cervical artery dissection can be related to underlying arteriopathies such as FMD, which must be differentiated from vasculitis and vasospasm.

P-194

Employment of Patient Data to Predict Transient Ischemic Attack after Acute Cerebrovascular Event

L Rivera (Weston), S Zaidi (Weston), T Syed (Weston), E Salgado (Weston)*

Background: Predicting short-term clinical outcome after an acute cerebrovascular event is challenging and involves teasing through a host of interactions between heterogeneous variables. We assessed the hypothesis that a diagnosis of transient ischemic attack (TIA) can be predicted after acute cerebrovascular event by stroke-specific, patient-specific, and management-specific data. Methods: We prospectively collected data on patients evaluated for acute cerebrovascular event at Cleveland Clinic Florida. Stroke-specific assessments included stroke type and etiology, vascular territory, and systemic complications. Patient-specific data included socio-demographics, timing and mode of transportation, stroke risk factors, and medication history. Management-specific data included thrombolytic therapy, in-hospital medications, and imaging and sonographic studies. Primary outcome was a diagnosis of TIA, as defined traditionally. Predictors of TIA with $p<0.20$ in bivariate analysis (chi-squared test, t-test) were used to build a logistic regression model, and only predictors with an associated $p<0.05$ were retained. *Results:* Data was collected prospectively for 156 consecutive patients. Bivariate analysis identified male gender, Caucasian ethnicity, diabetes mellitus, prior TIA or stroke, smoking history, and family history of stroke as predictors of TIA, and cardioembolic stroke, large-vessel stroke, hemorrhagic stroke, arterial thrombotic etiology, atrial fibrillation, and PCA territory involvement, as predictors of stroke. The LR model identified prior TIA or stroke (OR=2.7, [1.04, 6.98]) and smoking history (OR=4.1, [1.54, 11.1]) as predictors of TIA, and large-vessel stroke (OR=-4.9, [-16.4, -1.47]) and cardioembolic stroke (OR=-3.6, [-10.3, -1.10]) as predictors of stroke. *Conclusions:* TIA after an acute cerebrovascular event can be predicted by analyzing sociodemographics, cerebrovascular risk factors, stroke characteristics, and management data.

P-195

Aldose reductase inhibitors for diabetic neuropathy

C Chalk (Montreal), T Benstead (Halifax), F Moore (Montreal)*

Background: Much effort has been expended to test aldose reductase inhibitors (ARIs) in diabetic polyneuropathy. A Cochrane review of randomized controlled trials (RCTs) between 1981 and 1993 could not draw definite conclusions, but it relied on a surrogate primary outcome measure (nerve conduction velocity), rather than a clinically relevant measure, and included short duration trials, raising concerns about Type II error. *Methods:* We prepared a new Cochrane Protocol, using change in neurological examination as the primary outcome measure, and excluded trials less than 6 months duration. Secondary outcomes were nerve conduction data, neuropathic symptoms, quality of life, and occurrence of foot ulcers. We searched the Cochrane Register, MEDLINE, and EMBASE for citations. *Results:* Of 683 citations there were 26 RCTs of at least 6 months duration, involving 1408 ARI and 1094 control subjects. Trial methodological quality was variable, with important flaws in some. In 21 trials, neurological examination (most often vibration

perception) was assessed. Nerve conduction data were evaluated in 23; symptoms in 17; ulcers in 1; and quality of life in none. Meta-analysis of outcome measures is in progress. *Conclusion:* There are substantial RCT data assessing the effect of ARIs in diabetic neuropathy using clinically relevant outcomes over appropriate time intervals. Meta-analysis will allow a meaningful assessment of the effect of ARIs on diabetic neuropathy.

P-196

Stroke as presenting feature of Chagas' disease: a Canadian first

A Breiner (Montreal), P Giacomini (Montreal), G Thanassoulis (Montreal), L Durcan (Montreal)*

Background: Chagas' disease (American Trypanosomiasis) is caused by the parasite *Trypanosoma cruzi*, which is endemic to Latin America. In adults, Chagas' disease often manifests clinically with cardiac or gastrointestinal pathology, such as arrhythmias, congestive heart failure, megaesophagus, or megacolon. *Methods:* We report the first Canadian case of stroke as presenting feature of Chagas' disease. *Results:* A 39-year-old male of Guatemalan origin presented with a transient episode of dysarthria, left-sided hemiparesis, and hemisensory deficits. Radiological studies demonstrated a previous left insular cortical infarction. Given the evidence of previous ischemia, investigations were undertaken to determine the etiology of these events. Echocardiography revealed diffuse left ventricular dysfunction and an ejection fraction of 30%. Subsequent serum analysis demonstrated the presence of antibodies to *Trypanosoma cruzi*. *Conclusions:* With increasing immigration from Latin America, many seropositive individuals are now living in Canada. Stroke patients from endemic areas should have appropriate serologic testing for *T. cruzi*. Patients with known *T. cruzi* seropositivity and cardiomyopathy should be considered for anticoagulation to prevent ischemic events. Moreover, there is increasing evidence that cerebrovascular damage in Chagas' disease may not only be due to cardioembolic phenomena but that infection itself may lead to direct endothelial damage.

P-197

Hypertension and stroke: 2006 CHEP (Canadian Hypertension Educational Program) recommendations

J Boulanger (Greenfield Park)*

Background: Hypertension is the most important modifiable risk factor for stroke. The Canadian Hypertension Education Program (CHEP) updated its annual recommendations for the diagnosis and treatment of hypertension. Methods: We present the 2006 CHEP guidelines regarding the management of hypertension in patients with cerebrovascular disease. Results: The diagnosis of hypertension can be made as early as the second visit in patients with stroke. Blood pressure (BP) should be measured at home in patients receiving treatment for hypertension. Unless contraindicated, a combination of angiotensin-converting-enzyme (ACE) inhibitors and diuretics is the preferred therapy in these patients. Adherence to medication protocols should be stressed and simplified regimen (ex: fixed dose combinations) could be used. A blood pressure (BP) under 140/90mmHg should be obtained. In diabetics or renal diseases' patients, a tighter control (130mmHg/80mmHg) is warranted. Lifestyle interventions are also effective in the management of hypertension. There is uncertainty about the management of high blood pressure in acute stroke. Conclusions: A combination of ACE-inhibitors and diuretics is recommended in hypertensive stroke patients. Blood pressure should be maintained under 140/90 mmHg.

P-198

Impact of restrictive access to clopidogrel on patient health outcomes following cerebrovascular event in the elderly

O Sheehy (Montreal), S Rinfret (Montreal), E Leroux (Montreal), J LeLorier (Montreal)*

Background: In the province of Quebec (Canada), for patients who had a cerebrovascular accident (CVA), clopidogrel is only reimbursed if the accident occurred while under acetyl-salicylic acid (ASA). *Objective:* To determine the impact on patient health outcomes, including all-cause mortality, of this restrictive access to clopidogrel for patients satisfying the reimbursement criteria and estimate his "real-life" protective effect. *Methods:* We retrospectively studied patients who suffered from a CVA while already under ASA. Data from the administrative databases from Régie de l'assurance maladie du Québec were used. An algorithm using ICD-9 codes was used to identify patients and was validated by neurologists working at CHUM. Time Delay Attributable to Approval Process (TDAAP) was defined as number of days between first claim for a non-restricted cardiovascular preventive drug (NRCPD) and first claim for clopidogrel. We postulated that if clopidogrel had not been restricted, the patient would have filled their clopidogrel prescription at the same time as for any NRCPD prescription. *Results:* A total of 8,099 patients were identified with a new CVA that occurred while under ASA. Of these patients who received at least one NRCPD dispensation during their follow-up, 4,091 patients (50.4%) also received clopidogrel. The median TDAAP for these patients was 36 days (1st quartile: 10 days and 3rd quartile: 125 days). After controlling for age, gender, chronic disease score and health care resource utilization in the year prior to the CVA, the time-dependent exposure to clopidogrel was protective (HR=0.45, 95%CI=0.33-0.61) leading to better survival in these patients. *Conclusion:* Half of the patients who had a CVA while under ASA did not receive clopidogrel despite filling other NRCPD prescriptions. Time-dependent exposure to clopidogrel reduced the risk of all-cause mortality by 55%. The restrictive access to clopidogrel in Quebec might be responsible for the sub-optimal use of clopidogrel in this population.

P-199

Cerebral vascular dysfunction in diabetic patients is not restored with aggressive cholesterol-lowering treatment

R Ramos (Aracaju), J Barreto Filho (Aracaju), H de Melo (Aracaju), M Barros (Aracaju), F Cardoso (Aracaju), R Prado (Aracaju), R Cipolloti (Aracaju)*

Background: Cerebral vascular accident (CVA) is one of the main causes of morbi-mortality in diabetic patients. Impairment in vascular reactivity seems to identify patients with higher risk to cardiovascular events. It has been shown that statins may restore coronary and peripheral vascular dysfunction. The aim of our study was to

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

characterize the cerebral vascular reactivity during apnea maneuver in diabetic patients and to test the hypothesis of restoration of vascular dysfunction through the use of sinvastatin (40mg) /ezetimibe (10mg). *Methodology:* The cerebral vascular reactivity was evaluated through a noninvasive method (transcranial Doppler) during resting condition and during apnea. We measured mean flow velocity (MFV) and the pulsatility index (PI) in the right middle cerebral artery (MCA) in 9 normal control subjects (CO group) and in 12 diabetic patients (DM group) before and after cholesterol-lowering treatment for 2 months. *Results:* MFV and PI were significantly higher ($p<0.05$) in diabetic patients (67.2±0.27 cm/sec and 1.03±0.01) when compared to CO group (53.5±0.33 cm/sec and 0.9±0.01) during resting condition and apnea. After treatment, MFV and PI did not change compared to pre-treatment values, despite the aggressive decrease in LDL-C (178±44 to 81±30 mg/dL; $p<0.01$). In addition, Breath Holding Index did not show differences between CO group and DM group patients pre and post-treatment. *Conclusion:* Despite the aggressive reduction of LDL-C, total cholesterol and triglycerides, sinvastatin (40 mg) /ezetimibe (10mg) was not able to restore the cerebral vascular dysfunction observed in diabetic patients.

P-200

Use of the Internet by Stroke Survivors to Obtain Health Information

W Oczkowski (Hamilton), L Barr (Hamilton), E Moyer (Hamilton), S Pagliuso (Hamilton), C Pereira (Hamilton), D Yip (Hamilton)*

Background: The Internet has become very common as a source of information for the general public. It is not clear if the Internet is used or could be used by stroke survivors to obtain health information. The answer to this question has important implications as to how to provide health information to this population at high risk for recurrent stroke. *Methods:* Consecutive patients with TIA or stroke admitted to the integrated stroke unit at the Hamilton General Hospital, answered questions from a structured interview to obtain information about their access and use of the Internet. For patients with significant aphasia or neurocognitive impairment alternative communication techniques were used or the next of kin was interviewed. *Results:* Few patients use the Internet to access health information. Most patients do not have a computer, however, most reported that they could obtain access and assistance to use the Internet. Other than the Internet, patients use a variety of sources to obtain health information and identified health care providers as their main source of health information. *Conclusions:* Although popular with the general population, the Internet may not be the best method of providing health information to stroke survivors at this time.

P-201

Nonbacterial thrombotic endocarditis in stroke

J Scozzafava (Edmonton), G Jickling (Edmonton), M Hussain (Edmonton), S Ahmed (Edmonton), M Sqqur (Edmonton), T Jeerakathil (Edmonton), K Khan (Edmonton)*

Background: Nonbacterial Thrombotic Endocarditis (NBTE) is rare but important clinical entity to recognize. *Methods:* Case Report/Literature Review. *Case Report:* A 46-year-old Asian woman presented with recurrent episodes of transient disorientation and speech abnormalities. Subsequently, she experienced episodes of prominent motor symptoms, which resolved without sequelae. She also noticed increasing difficulty with short term memory and expressive speech. Physical exam revealed a loud grade IV/VI pansystolic murmur loudest at the apex, splinter hemorrhages and palmar erythema, as well as mild cognitive impairment. Cranial CT and MRI scans showed several small infarcts, including a recent left frontal infarct. Transesophageal echocardiogram showed a mass on the mitral valve. The septic workup was negative. Nonbacterial thrombotic endocarditis was suspected. Further investigation revealed a mass in the right middle lobe of the lung, which was identified to be adenocarcinoma. Despite aggressive antithrombotic treatment, the patient had further embolic events. *Discussion:* NBTE causes embolic events, including strokes. It is important to identify as it may be associated with an underlying neoplasm or other systemic disorder. It is often resistant to treatment and is associated with a poor prognosis.

P-202

Using fMRI to map brain activation in patients with congenital hemiplegia following left middle cerebral artery stroke

C Gonzalez (London), S Pigott (London), S Mirsattari (London)*

Background: Functional MRI (fMRI) studies have revealed task-related activation in both cerebral hemispheres of patients with unilateral stroke suggesting a wide range of functional reorganization. It is not well understood if this reorganization can occur across different cognitive domains within the same patient. The purpose of this study was to assess activated areas of the brain concerned with the motor, sensory, language and visual paradigms in three patients that suffered similar non-progressive lesions in early life. *Methods:* Three patients (ages 25, 19, and 18 years) with right-sided congenital hemiplegia following left MCA infarcts at or before birth were studied. All patients developed epilepsy before the age of 5 years. A high resolution anatomical scan and an echo planar sequence was used to measure the fMRI signal over time across a variety of conditions in a 4.0 Tesla Unity total body research MRI. *Results:* All patients had significant functional reorganization in motor, somatosensory and language paradigms, which was directly related to the size of the lesions: larger lesions activated the intact-right hemisphere alone or both hemispheres, whereas the smaller lesion in one of the patients resulted in more normal activation. *Conclusion:* The pattern of cerebral reorganization and functional outcome after early brain insult is closely related to the size of the lesion.

P-203

The Suboccipital "Rind Sign"-an imaging sign of extracranial vertebral artery(VA) dissection with a normal-appearing lumen

C Lum (Ottawa), S Panughpath (Ottawa), F Al-Azri (Ottawa), W Miller (Ottawa), M Kingstone (Ottawa), T Nguyen (Ottawa), M Goyal (Ottawa)*

Background: The imaging findings of acute dissection are well known and include an intraluminal intimal flap, focal irregular stenosis with or without intramural hematoma (best seen as a crescent

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

on axial images). Catheter angiography has long been considered the "gold standard" for imaging dissections however, it only images the vascular lumen. Newer vascular imaging techniques include CTA, time-of-flight(TOF) and contrast-MRA. We present 2 cases of VA dissection at the skull base where the lumen was normal at imaging. Review of the source images from CTA & MRA showed a rind of intramural thickening in the portion of the VA coursing over the C1 arch, an appearance we coin as the suboccipital "rind sign". This "rind sign" was helpful in diagnosing a third case of previously unsuspected VA dissection. *Methods:* We reviewed our electronic database for cases of suspected VA dissection with normal appearing lumens *Results:* 2 pts were found to have the "rind sign" and normal lumens. Both pts had suboccipital headaches. One pt had an LP suspicious for SAH. One pt had 2 normal cerebral angiograms. Review of the source images from the TOF-MRA and CTA demonstrated an intramural hematoma isolated to C1 arch portion of the vertebral artery without extension of the hematoma to the vertical portion of the VA. *Conclusion:* The suboccipital "rind sign" is a helpful imaging sign in cases of VA dissection with a normal cerebral angiogram or normal appearing lumen at CTA or MRA. The sign is explained by the intramural hematoma seen parallel to the horizontal portion of the VA coursing over the C1 arch. In our 2 cases, the hematoma didn't extend into the vertical portion of the VA where the more familiar crescentic intramural hematoma is seen. Imaging of the arterial lumen with non-invasive techniques such as contrast-enhanced MRA or conventional cerebral angiography is insufficient to exclude the diagnosis of VA dissection. Imaging of the arterial wall is necessary to exclude VA dissection.

P-204

Reconstruction of an occluded dissected internal carotid artery using multiple covered stents in the setting of acute stroke to allow intra-arterial thrombolysis: a case report

M Goyal (Ottawa), F Al-Azri (Ottawa), C Lum (Ottawa)*

Purpose: To describe a case of reconstruction of an occluded dissected internal carotid artery using multiple covered stents in the setting of acute stroke to allow intra-arterial thrombolysis *Case Report:* This 18 year old healthy gentleman presented with multiple injuries from a motor vehicle accident. On the 10th day while still in the hospital he suddenly became plegic on the left side. An urgent MRI showed bilateral internal carotid dissecting aneurysms. In addtion, the right internal carotid artery was occluded with clot extending to the right middle cerebral artery (MCA). No abnormality was seen on the diffusion weighted imaging. The patient was started on IV-tPA. There was no improvement in the neurological state after 45 minutes and a decision was made to proceed with an intra-arterial approach. An angiogram showed complete occlusion of the RICA at its origin. A microcatheter and microwire was navigated through the occlusion and could be advanced beyond the pseudoaneurysm to the right MCA. 5 mg of tPA was injected into the clot without success. At this stage a decision was made to stent the ICA. Using telescoping covered stents (Symbiot, 4mm by 21 mm; Boston Scientific, Fremont, CA) the ICA was reconstructed with good antegrade flow and no residual filling of the pseudoaneurysm. The patient was loaded with Clopidogrel (300mg) and Aspirin (325mg) prior to the placement of the stent and was on IV heparin. After the placement of the stent there was complete recanalization of the right MCA and a complete clinical recovery. The patient continues to be fully intact neurologically at 6 month follow up and CT angiogram showed patency of the right ICA.
Summary: We describe a case of aggressive management of acute stroke due to a dissected internal carotid artery with reconstruction of the artery performed using multiple covered stents.

P-205

Carotid artery stenting at the Ottawa Hospital: long-term outcome and predictors of restenosis

D Dowlatshahi (Ottawa), M Hogan (Ottawa), S Mandino (Ottawa), M Richard (Ottawa), M Sharma (Ottawa)*

Background: Carotid artery angioplasty and stenting (CAS) has gained popularity for stroke prevention following trials demonstrating its feasibility and safety. Widespread use of CAS has fostered interest in long term clinical and radiological outcomes. Little information is available on outcomes in the Canadian setting. *Methods:* The Cerebrovascular Laboratory at the Ottawa Hospital collected clinical and ultrasound data from 70 patients for a total of 83 carotid stents. Patients were followed up to a maximum of 8 years (mean 3.9) and clinical data including demographics, medical history and medications were collected. Stent patency was assessed by ultrasound using a standardized protocol at 1-month, 6-month and at subsequent 12-month intervals. Select patients underwent additional carotid imaging using CTA, MRA and conventional angiography. *Results:* Our final analysis will include the rates of procedure-related complications, long-term clinical outcomes and vascular events. Carotid stent patency will be presented as a measure of change in ultrasound velocities over time, as there are no current consensus thresholds for determining in-stent stenosis. These velocities will be correlated to other imaging modalities in a subset of patients. Finally, we will attempt to elucidate factors that may predict restenosis and clinical outcomes. *Conclusions:* Our institutional data will add to the observational literature depicting CAS outcomes and will attempt to identify predictors of restenosis.

P-206

Non-Invasive Imaging in Patients with Cerebrovascular Disease: Avoiding Misdiagnosis

S Panughpath (Ottawa), M Goyal (Ottawa), F Al Azri (Ottawa), T Nguyen (Ottawa), M Kingstone (Ottawa), W Miller (Ottawa), C Lum (Ottawa)*

Background: Non-invasive imaging has taken up a primary role in the workup of patients with cerebrovascular disease. To ascertain the full potential of the imaging modality and to make the correct diagnosis, it is important to recognize areas that may be overlooked. This poster illustrates, using different clinical scenarios, potential pitfalls in non-invasive vascular imaging and suggestions to avoid these. *Materials and methods:* We selected cases from our vascular imaging teaching file demonstrating important teaching points to facilitate accurate diagnosis of cerebrovascular disease. *Results:* The following clinical situations have been discussed with emphasis on avoiding misdiagnosis.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

1 Non-invasive imaging of suspected vertebral artery dissection in which the lumen appeared normal with evidence of intramural hematoma.
2 Unremarkable non-contrast CT scan in patients with suspected acute infarct.
3 Coexistence of cerebrovascular disease with an obvious underlying disorder.
4 Use of perfusion CT to aide the diagnosis and management of subtle acute stroke on CT.
5 Acute infarct from an aortic thrombus (visible at the edge of the dataset of the MR angiogram).
6 Importance of timing of contrast injection for CT angiogram and contrast-enhanced MR angiogram

Conclusion: This exhibit emphasizes potential pitfalls of non-invasive cardiovascular imaging and ways to avoid misdiagnosis.

Trauma and General Neurosurgery

P-207

Effects of Nasogastric Tube Feeding on Serum Sodium Potassium, and Glucose levels on head injury Patients

S Shabbidar (Rasht), S Yoosefzadeh (Rasht), M Ahmadi (Rasht), H Mohammadi (Rasht)*

Objective: To examine whether significant alteration in serum sodium, potassium, and glucose levels occurred after nasogastric tube feeding in head injury patients. *Material and methods*: In this study 85 head injury patients admitted to neuro ICU were selected and serum sodium , potassium , and glucose levels were analyzed on the day before and 1st, 2nd, 3rd days of nasogastric feeding. *Results:* The mean value of sodium levels on the day before and 2nd and 3rd days of nasogastric feeding were lower than normal range, that compared to the day before feeding was statistically signification, ($p<0.05$). The mean value of potassium levels on the day before and 1st, 2nd and 3rd days of nasogastric feeding were lower than the normal range. Alteration in 3 days after feeding compared to the day before was statistically significant.($p<0.05$).Values of blood glucose the day before, 1st, 2nd, 3rd,nasogastic tube feeding higher than normal range. But increase after tube feeding was statistically significant. ($p<0.001$). *Conclusion:* There is a need for controlling blood glucose and serum electrolyte in head injury patients receiving enteral nutrition is evident.

P-208

Empirical Evaluation of the Windsor Arithmetic Cognitive Tool (WACT) in a Normal Population

B Jhawar (Windsor), P Oldfield* (Windsor), V Kokavec (Windsor), R Chawla (Windsor), N Liem (Windsor)*

Introduction: For many patients with brain injury, neurological function can fluctuate rapidly. We have developed a simple arithmetic tool that measures cognitive capacity that is sensitive to daily changes. As part of the first phase of the development of this tool we set out to test the theoretical properties of this instrument. *Methods:* After REB approval we interviewed 81 healthy individuals and collected information on educational level, mathematical aptitude, age, sex and occupation. Each of these individuals was then asked nine arithmetic questions that varied in the number of digits that were manipulated as well as the degree of carrying required. Correct responses were analyzed using logistic regression models controlling for confounding factors. *Results:* Age, educational level, occupation and mathematical aptitude varied diversely. We obtained 729 responses. We found that as the operand digits increased, the odds ratio for obtaining an incorrect response increased (OR=2.4; 95%CI=2.1-2.7) and when carrying was required the problem became more difficult (OR=2.8; 95%CI=2.1-3.7). As expected questions with higher WACT scores were more likely to be incorrect (OR=2.4; 95%CI=2.2-2.8). When we controlled for confounding factors our results did not appreciably change. *Conclusion:* The WACT is a theoretically sound instrument with good test properties. It allows assessment of a wide spectrum of individuals (from accountants to severe brain injury). We believe that this will prove to be a valuable tool for clinical neurological assessment.

P-209

Effects of mu and kappa opioids on injury-induced microglial accumulation in the leech CNS: involvement of the nitric oxide pathway

N Yahyavi-Firouz-Abadi (Tehran), P Tahsili-Fahadan (Tehran), S Ostad (Tehran)*

Background: Damage to the leech or mammalian CNS increases nitric oxide (NO) production and causes accumulation of microglial cells at the injury site. μ and κ ligands are shown to have different effects in neurodegeneration and their effects are bound to the NO pathway. *Methods:* Leech nerve cords were dissected and placed in Leibowitz supplemented medium. Crush was made with fine forceps and cords were double stained with antibody to endothelial nitric oxide synthase (eNOS) which is expressed at the injury site and Hoechst 33258 fluorescent dye that stains the microglia nuclei. The effects of different concentrations of μ ligands: morphine, naloxone, DAMGO (selective μ agonist), CTAP (selective μ antagonist), and κ ligands: nor-BNI (selective κ agonist) and U-50488 (selective κ antagonist) were assessed. Moreover, the effect of pretreatment with non selective NOS inhibitor L-NAME was investigated. *Results:* Morphine and naloxone but not selective μ opioid peptides attenuated the microglial accumulation in a dose dependent manner. The effect of morphine (10 mM) was reversed with naloxone (10 mM) and L-NAME (1 mM). Naloxone inhibited the expression of eNOS at the site of injury. In addition, Nor-BNI and U-50488 (1 mM) attenuated the microglial accumulation. The effect of U-50488 was also blocked by L-NAME. *Conclusion:* μ selective alkaloid but not peptide agonists and also κ agonist attenuate the injury-induced microglial accumulation via release of NO. Opioids may assume a larger role in nerve repair and recovery from injury by modulating accumulation of microglia at the site of injury.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

INDEX

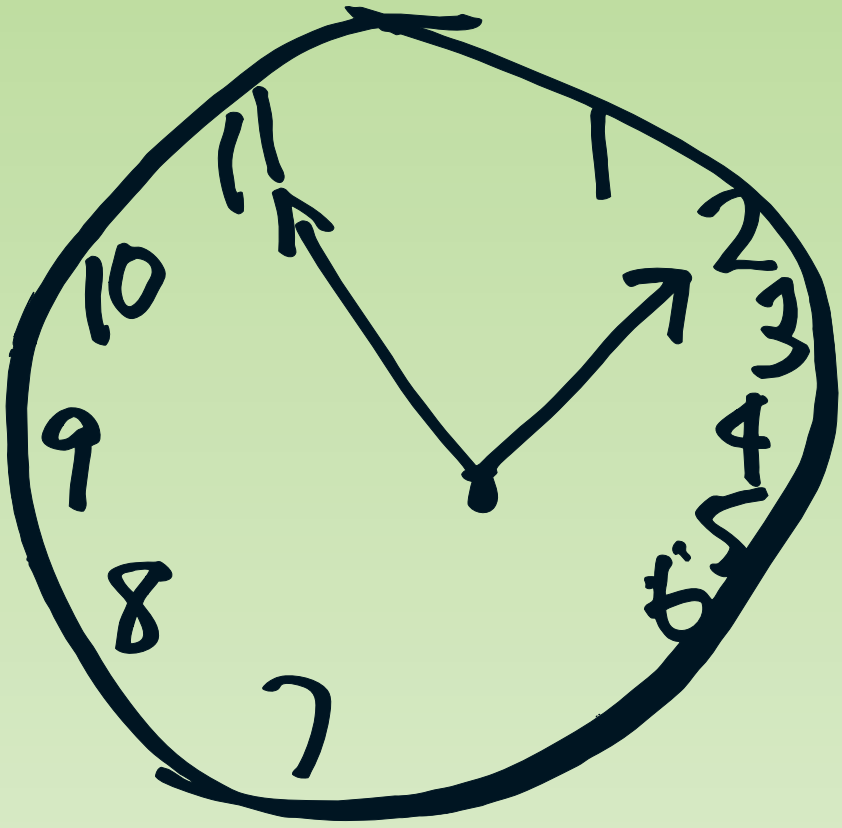
https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press



NEW
Once-a-Day
REMINYL ER

It's Time To Take Another Look at REMINYL.

REMINYL is now available in a once-a-day formulation: REMINYL ER.[1] Consider new REMINYL ER as initial treatment in AD.

REMINYL ER (galantamine hydrobromide) is indicated for the symptomatic treatment of patients with mild to moderate dementia of the Alzheimer's type. REMINYL ER has not been studied in controlled clinical trials for longer than 6 months.

The most common side effects (vs. placebo) in a clinical trial were nausea (17% vs. 5%), dizziness (10% vs. 4%), injury (8% vs. 6%) and headache (8% vs. 6%). For patients who experienced adverse events, the majority occurred during the dose-escalation phase.

There is no evidence that galantamine alters the course of the underlying dementing process.

REFERENCE: 1. REMINYL* (galantamine hydrobromide tablets), REMINYL* ER (galantamine hydrobromide extended-release capsules) Product Monograph, JANSSEN-ORTHO Inc., April 8, 2005.

JANSSEN-ORTHO
19 Green Belt Drive, Toronto
Ontario, Canada, M3C 1L9

Member R&D PAAB

galantamine HBr
Pr Reminyl* ER

New Once-Daily:
It may change your mind.

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

ROJA050820E

MICARDIS® (telmisartan)

40 mg and 80 mg Tablets
THERAPEUTIC CLASSIFICATION:
Angiotensin II AT, Receptor Blocker

INDICATIONS AND CLINICAL USE

MICARDIS® (telmisartan) is indicated for the treatment of mild to moderate essential hypertension.
MICARDIS® may be used alone or in combination with thiazide diuretics.
The safety and efficacy of concurrent use with angiotensin converting enzyme inhibitors have not been established. Information on the use of telmisartan in combination with beta blockers is not available.

CONTRAINDICATIONS

MICARDIS® (telmisartan) is contraindicated in patients who are hypersensitive to any components of this product (see Composition).

WARNINGS

Pregnancy:
Drugs that act directly on the renin-angiotensin system can cause fetal and neonatal morbidity and mortality when administered to pregnant women. If pregnancy is detected, MICARDIS® (telmisartan) should be discontinued as soon as possible. The use of drugs that act directly on the renin-angiotensin system during the second and third trimesters of pregnancy has been associated with fetal and nonnatal injury, including hypotension, neonatal skull hypoplasia, anuria, reversible or irreversible renal failure, and death. Oligohydramnios has also been reported, presumably resulting from decreased fetal renal function; oligohydramnios in this setting has been associated with fetal limb contractures, craniofacial deformation, and hypoplastic lung development. Prematurity, intrauterine growth retardation, and patent ductus arteriosus have also been reported, although it is not clear whether these occurrences were due to exposure to the drug. These adverse effects do not appear to have resulted from intrauterine drug exposure that has been limited to the first trimester. Mothers whose embryos and fetuses are exposed to an angiotensin II receptor antagonist only during the first trimester should be so informed. Nonetheless, when patients become pregnant, physicians should have the patient discontinue the use of MICARDIS® as soon as possible unless it is considered life-saving for the mother. Rarely, probably less often than once in every thousand pregnancies, no alternative to an angiotensin II AT_1 receptor antagonist will be found. In these rare cases, the physician should apprise mothers of the potential hazards to their fetuses, and serial ultrasound examinations should be performed to assess the intra amniotic environment. If oligohydramnios is observed, contraction stress testing (CST), a non-stress test (NST), or biophysical profiling (BPP) may be appropriate, depending upon the week of pregnancy. Patients and physicians should be aware, however, that oligohydramnios may not appear until after the fetus has sustained irreversible injury. Infants with histories of in utero exposure to an angiotensin II AT_1 receptor antagonist should be closely observed for hypotension, oliguria, and hyperkalemia. If oliguria occurs, attention should be directed toward support of blood pressure and renal perfusion. Exchange transfusion may be required as a means of reversing hypertension and/or substituting for disordered renal function. Telmisartan is not removed from plasma by hemodialysis. No teratogenic effects were observed when telmisartan was administered to pregnant rats at oral doses of up to 50 mg/kg/day and to pregnant rabbits at oral doses of up to 45 mg/kg/day with saline supplementation. In rabbits, fetotoxicity (total resorptions) associated with maternal toxicity (reduced body weight gain, mortality) was observed at the highest dose level (45 mg/kg/day). In rats, maternally toxic (reduction in body weight gain and food consumption) telmisartan doses of 50 mg/kg/day in late gestation and during lactation were observed to produce adverse effects in rat fetuses and neonates, including reduced viability, low birth weight, delayed maturation, and decreased weight gain. Significant levels of telmisartan were present in rat milk and rat fetuses' blood during late gestation.

Hypotension:
In patients who are volume-depleted by diuretic therapy, dietary salt restriction, dialysis, diarrhea or vomiting, symptomatic hypotension may occur after initiation of therapy with MICARDIS®. These conditions should be corrected prior to administration of MICARDIS®. In these patients, because of the potential fall in blood pressure, therapy should be started under close medical supervision. Similar considerations apply to patients with ischemic heart or cerebrovascular disease, in whom an excessive fall in blood pressure could result in myocardial infarction or cerebrovascular accident.

PRECAUTIONS

General:
Hepatic Impairment: As the majority of telmisartan is eliminated by biliary excretion, patients with biliary obstructive disorders or hepatic insufficiency have reduced clearance of telmisartan. Three-to four-fold increases in C_{max} and AUC were observed in patients with liver impairment as compared to healthy subjects. MICARDIS® (telmisartan) should be used with caution in these patients (see DOSAGE AND ADMINISTRATION).
Renal Impairment: As a consequence of inhibiting the renin-angiotensin-aldosterone system, changes in renal function may be anticipated in susceptible individuals. In patients whose renal function may depend on the activity of the renin-angiotensin-aldosterone system, such as patients with bilateral renal artery stenosis, unilateral renal artery stenosis to a solitary kidney, or severe congestive heart failure, treatment with agents that inhibit this system has been associated with oliguria, progressive azotemia, and rarely acute renal failure and/or death. There is no experience with long-term use of MICARDIS® (telmisartan) in patients with unilateral or bilateral renal artery stenosis, but an effect similar to that seen with ACE inhibitors should be anticipated. In susceptible patients, concomitant diuretic use may further increase the risk. Use of telmisartan should include appropriate assessment of renal function in these types of patients.
Valvular Stenosis: There is concern on theoretical grounds that patients with aortic stenosis might be at a particular risk of decreased coronary perfusion, because they do not develop as much afterload reduction.
Hyperkalemia: Drugs such as MICARDIS® that affect the renin-angiotensin-aldosterone system can cause hyperkalemia. Monitoring of serum potassium in patients at risk is recommended. Based on experience with the use of other drugs that affect the renin-angiotensin system, concomitant use with potassium-sparing diuretics, potassium supplements, salt substitutes containing potassium or other medicinal products that may increase the potassium level (heparin, etc.) may lead to a greater risk of an increase in serum potassium.
Use in Nursing Mothers: It is not known whether telmisartan is excreted in human milk, but telmisartan was shown to be present in the milk of lactating rats. Because of the potential for adverse effects on the nursing infant, a decision should be made whether to discontinue nursing or discontinue the drug, taking into account the importance of the drug to the mother.
Use in Children: Safety and effectiveness in pediatric patients have not been established.
Use in the Elderly: Of the total number of patients receiving MICARDIS® (telmisartan) in clinical studies, 551 (18.6%) were 65 to 74 years of age and 130 (4.4%) were 75 years or older. No overall age-related differences were seen in the adverse effect profile, but greater sensitivity in some older patients cannot be ruled out.
Effects on Ability to Drive and Use Machines: No studies on the effect on the ability to drive and use machines have been performed. However, when driving vehicles or operating machinery, it must be borne in mind that dizziness or drowsiness may occasionally occur when taking antihypertensive therapy.
Drug Interactions:
Warfarin: MICARDIS® (telmisartan) administered for 10 days slightly decreased the mean warfarin trough plasma concentration; this decrease did not result in a change in International Normalized Ratio (INR). Coadministration of MICARDIS® also did not result in a clinically significant interaction with acetaminophen, amlodipine, glyburide, hydrochlorothiazide or ibuprofen. For digoxin, median increases in digoxin peak plasma concentration (49%) and in trough concentration (20%) were observed. It is recommended that digoxin plasma levels be monitored when initiating, adjusting or discontinuing MICARDIS®.
Lithium: Reversible increases in serum lithium concentrations and toxicity have been reported during concomitant administration of lithium with angiotensin converting enzyme inhibitors. Very rare cases have also been reported with angiotensin II receptor antagonists. Therefore, serum lithium level monitoring is advisable during concomitant use.

ADVERSE EVENTS

MICARDIS® (telmisartan) has been evaluated for safety in 27 clinical trials involving 7,968 patients. Of these 7,968 patients, 5,788 patients were treated with MICARDIS® monotherapy including 1,058 patients treated for ≥1 year and 1,395 patients treated in placebo-controlled trials. In 3,400 patients, discontinuation of therapy due to adverse events was required in 2.8% of MICARDIS® patients and 6.1% placebo patients. The following potentially serious adverse reactions have been reported rarely with telmisartan in controlled clinical trials: syncope and hypotension. In placebo-controlled trials, no serious adverse event was reported with a frequency of greater that 0.1% in MICARDIS®-treated patients.

ALL CLINICAL TRIALS

The adverse drug events listed below have been accumulated from 27 clinical trials including 5,788 hypertensive patients treated with telmisartan. Adverse events have been ranked under headings of frequency using the following convention: very common (≥1/10); common (≥1/100, >1/10); uncommon (≥1/1.000, <1/100); rare (≥1/10.000, <1/1.000); very rare (<1/10.000).
Body as a Whole, General: Common: Back pain (e.g. sciatica), chest pain, influenza-like symptoms, symptoms of infection (e.g. urinary tract infections including cystitis), fatigue, conjunctivitis. Uncommon: Abnormal vision, sweating increased.
Cardiovascular System: Common: Edema, palpitation.
Central and Peripheral Nervous System: Very common: Headache. Common: Dizziness, insomnia. Uncommon: Vertigo.
Gastro-Intestinal System: Common: Abdominal pain, diarrhea, dyspepsia, nausea, constipation, gastritis. Uncommon: Dry mouth, flatulence.
Musculo-Skeletal System: Common: Arthralgia, cramps in legs or leg pain, myalgia, arthritis, arthrosis. Uncommon: Tendinitis like symptoms.
Psychiatric System: Common: Anxiety, depression, nervousness.
Respiratory System: Common: Upper respiratory tract infections including pharyngitis and sinusitis, bronchitis, coughing, dyspnea, rhinitis.
Skin and Appendages Systems: Common: Skin disorders like eczema, rash.

CLINICAL LABORATORY FINDINGS

Hemoglobin: Infrequently, a decrease in hemoglobin has been observed which occurs more often during treatment with telmisartan than with placebo.

PLACEBO-CONTROLLED TRIALS

The overall incidence of adverse events reported with MICARDIS® (41.4%) was usually comparable to placebo (43.9%) in placebo-controlled trials. Adverse events occurring in 1% or more of 1,395 hypertensive patients treated with MICARDIS® monotherapy in placebo-controlled clinical trials, regardless of drug relationship, include the following:

Adverse Event, by System	MICARDIS® Total n=1,395 %	Placebo n=583 %
Body as a Whole		
Back pain	2.7	0.9
Chest pain	1.3	1.2
Fatigue	3.2	3.3
Influenza-like symptoms	1.7	1.5
Pain	3.5	4.3
Central & Peripheral Nervous System		
Dizziness	3.6	4.6
Headache	8.0	15.6
Somnolence	0.4	1.0
Gastrointestinal System		
Diarrhea	2.6	1.0
Dyspepsia	1.6	1.2
Nausea	1.1	1.4
Vomiting	0.4	1.0
Musculoskeletal System		
Myalgia	1.1	0.7
Respiratory System		
Coughing	1.6	1.7
Pharyngitis	1.1	0.3
Sinusitis	2.2	1.9
Upper respiratory tract infection	6.5	4.6
Heart Rate and Rhythm Disorders		
ECG abnormal specific	0.2	1.0
Palpitation	0.6	1.0
Cardiovascular Disorders, General		
Hypertension	1.0	1.7
Oedema peripheral	1.0	1.2

The incidence of adverse events was not dose-related and did not correlate with the gender, age, or race of patients.
In addition, the following adverse events, with no established causality, were reported at an incidence of <1% in placebo-controlled clinical trials.
Autonomic Nervous Systems Disorders: sweating increased.
Body as a Whole: abdomen enlarged, allergy, cyst nos, fall, fever, leg pain, rigors, syncope.
Cardiovascular Disorders, General: hypotension, hypotension-postural, leg edema.
Central & Peripheral Nervous System Disorders: hypertonia, migraine-aggravated, muscle contraction-involuntary.
Gastrointestinal System Disorders: anorexia, appetite increased, flatulence, gastrointestinal disorder nos, gastroenteritis, gastroesophageal reflux, melena, mouth dry, abdominal pain.
Heart Rate & Rhythm Disorders: arrhythmia, tachycardia.
Metabolic & Nutritional Disorders: diabetes mellitus, hypokalemia.
Musculoskeletal System Disorders: arthritis, arthritis aggravated, arthrosis, bursitis, fascitis plantar, tendinitis.
Myo Endo Pericardial & Valve Disorders: myocardial infarction.
Psychiatric Disorders: nervousness.
Red Blood Cell Disorders: anemia.
Reproductive Disorders, Female: vaginitis.
Resistance Mechanism Disorders: abscess, infection, bacterial, moniliasis genital, otitis media.
Respiratory System Disorders: bronchospasm, epistaxis, pneumonia, bronchitis.
Skin & Appendage Disorders: rash, skin dry.
Urinary System Disorders: dysuria, hematuria, micturition disorder, urinary tract infection.
Vascular (Extracardiac) Disorders: cerebrovascular disorder, purpura.
Vision Disorders: vision abnormal.
Clinical Laboratory Findings:
In placebo-controlled clinical trials involving 1,041 patients treated with MICARDIS® monotherapy, clinically relevant changes in standard laboratory test parameters were rarely associated with administration of MICARDIS®.
Creatinine, Blood Urea Nitrogen: Increases in BUN (≥11.2 mg/dL) and creatinine (≥0.5 mg/dL) were observed in 1.5% and 0.6% of MICARDIS®-treated patients; the corresponding incidence was 0.3% each for placebo-treated patients. These increases occurred primarily with MICARDIS® in combination with hydrochlorothiazide. One telmisartan-treated patient discontinued therapy due to increases in creatinine and blood urea nitrogen.
Hemoglobin, Hematocrit: Clinically significant changes in hemoglobin and hematocrit (<10 mg/dL and <30% respectively) were rarely observed with MICARDIS® treatment and did not differ from rates in placebo-treated patients. No patients discontinued therapy due to anemia.
Serum Uric Acid: An increase in serum uric acid (≥2.7 mg/dL) was reported in 1.7% of patients treated with MICARDIS® and in 0.0% of patients treated with placebo. Clinically significant hyperuricemia (≥10 mEg/L) was observed in 2.3% of patients with MICARDIS® with 0.4% reported in patients at baseline. Increases in serum acid were primarily observed in patients who received MICARDIS® in combination with hydrochlorothiazide. No patient was discontinued from treatment due to hyperuricemia.
Liver Function Tests: Clinically significant elevations in AST and ALT (>3 times the upper limit of normal) occurred in 0.1% and 0.5% respectively of patients treated with MICARDIS® compared to 0.8% and 1.7% of patients receiving placebo. No telmisartan-treated patients discontinued therapy due to abnormal hepatic function.
Serum Potassium: Marked laboratory changes in serum potassium (≥+/-1.4 mEg/L) occurred rarely and with a lower frequency in MICARDIS®-treated patients (0.3%, 0.1%, respectively) than in placebo patients (0.6%, 0.3%, respectively). Clinically significant changes in potassium (that exceed 3 mEg/L were found in 0.6% of MICARDIS®-treated patients, with 0.5% of these reported at baseline. The corresponding rates for placebo-treated patients were 0.6% and 0.8%.
Cholesterol: In placebo-controlled trials, marked increases in serum cholesterol were reported in a total of 6 telmisartan-treated patients (0.4%) and no placebo patients. Two of these patients were followed over time; in both cases cholesterol values reverted to baseline levels. Serum elevations in cholesterol were reported as adverse events in 11 of 3,445 patients (0.3%) in all clinical trials. There were no reported cases of hypercholesterolemia in telmisartan-treated patients in placebo-controlled trials.

POST-MARKETING EXPERIENCE

Since the introduction of telmisartan in the market, cases of erythema, pruritus, faintness, insomnia, depression, stomach upset, vomiting, hypotension, bradycardia, tachycardia, dyspnoea, eosinophilia, thrombocytopenia, weakness and lack of efficacy have been reported rarely. As with other angiotensin II antagonists rare cases of angio-oedema, pruritis, rash and urticaria have been reported.

SYMPTOMS AND TREATMENT OF OVERDOSAGE

Limited data are available with regard to overdosage in humans. The most likely manifestation of overdosage would be hypotension and/or tachycardia. If symptomatic hypotension should occur, supportive treatment should be instituted. Telmisartan is not removed by hemodialysis.

DOSAGE AND ADMINISTRATION

The recommended dose of MICARDIS® (telmisartan) is 80 mg once daily.
The antihypertensive effect is present within 2 weeks and maximal reduction is generally attained after four weeks. If additional blood pressure reduction is required, a thiazide diuretic may be added.
No initial dosing adjustment is necessary for elderly patients or for patients with renal impairment, but greater sensitivity in some older individuals cannot be ruled out. Markedly reduced telmisartan plasma levels were observed in patients on hemodialysis.
For patients with hepatic impairment, a starting dose of 40 mg is recommended (see PRECAUTIONS, Hepatic Impairment). MICARDIS® should be taken consistently with or without food.
Composition:
MICARDIS® Tablets contain the following inactive ingredients: sodium hydroxide, meglumine, povidone, sorbitol, and magnesium stearate.
Stability and Storage Recommendations:
MICARDIS® Tablets are hygroscopic and require protection from moisture. Tablets are packaged in blisters and should be stored at room temperature, 15 to 30°C (59-86°F).
Tablets should not be removed from blisters until immediately prior to administration.

AVAILABILITY OF DOSAGE FORMS

MICARDIS® is available as white, oblong-shaped, uncoated tablets containing telmisartan 40 mg or 80 mg. Tablets are marked with the Boehringer Ingelheim logo on one side, and on the other side, with a decorative score and either 51H or 52H for the 40 mg and 80 mg strengths, respectively.
MICARDIS® Tablets 40 mg are individually blister sealed in cartons of 28 tablets as 4 cards containing 7 tablets each.
MICARDIS® Tablets 80 mg are individually blister sealed in cartons of 28 tablets as 4 cards containing 7 tablets each.

Product Monograph available upon request.

References:
1. Littlejohn T, *et al.* A prospective, randomized, open-label trial comparing telmisartan 80 mg with valsartan 80 mg in patients with mild to moderate hypertension using ambulatory blood pressure monitoring. *Can J Cardiol* 2000;16(9):1123-1132. **2.** Lacourcière Y, *et al.* A comparison of the efficacy and duration of action of the angiotensin II receptor blocker telmisartan to amlodipine. *Blood Pressure Monitoring* 1998;3(5):295-302. **3.** MICARDIS® Product Monograph, Boehringer Ingelheim (Canada) Ltd. May 2005. **4.** Cozaar® Product Monograph, E.I. du Pont de Nemours and Company. **5.** Diovan® Product Monograph, Novartis. **6.** Avapro™ Product Monograph (Canada), Sanofi-Synthelabo. **7.** Atacand® Product Monograph, AstraZeneca Pharma Inc. **8.** Teveten® Product Monograph, Solvay Pharma Inc.

MICARDIS®
TELMISARTAN 80mg AT_1 RECEPTOR BLOCKER
GOOD MORNING. MICARDIS.

Boehringer Ingelheim
www.boehringer-ingelheim.ca
Boehringer Ingelheim (Canada) Ltd.
5180 South Service Rd.,
Burlington, Ontario L7L 5H4

PAAB
Member R&D

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

PRESCRIBING INFORMATION

Pr Aggrenox® Capsules

(Dipyridamole / Acetylsalicylic Acid)

200 mg Extended Release Dipyridamole / 25 mg Immediate Release Acetylsalicylic Acid (ASA)

THERAPEUTIC CLASSIFICATION

Antiplatelet Agent

CLINICAL PHARMACOLOGY

AGGRENOX was studied in a double-blind, placebo-controlled, 24-month study (European Stroke Prevention Study 2 - ESPS-2)* in which 6602 patients participated. Seventy six percent (76%) had an ischemic stroke and 24% had a transient ischemic attack within three months prior to entry. Mean age of the patients was 66.7 years. The gender disposition was 58.0% male and 42.0% female. Patients were randomized to one of four treatment groups using a 2-by-2 factorial design: AGGRENOX (extended release dipyridamole 200 mg/ASA 25 mg); extended release dipyridamole (ER-DP) 200 mg alone; ASA 25 mg alone; or placebo. Patients received one capsule twice daily (morning and evening). Efficacy assessments included analyses of stroke (fatal or non-fatal) as confirmed by a blinded assessment group, as well as analyses of stroke (fatal or non-fatal) as confirmed by a blinded assessment group, as well as analyses of the combined endpoint of stroke or death. Secondary endpoints were transient ischemic attack (TIA), other vascular (OVE), myocardial infarction (MI) and ischemic events. OVE was defined as a composite of deep venous thrombosis, peripheral arterial occlusion, pulmonary embolism, and retinal vascular occlusion. Ischemic events comprised stroke, MI, and sudden death.

STROKE ENDPOINT

AGGRENOX significantly reduces the risk of stroke by 36.8% compared with placebo (p<0.001). Factorial analysis demonstrated that ER-DP reduces the risk of stroke by 18.9% (p=0.001) and ASA reduces the risk of stroke by 21.2% (p<0.001) when compared to placebo. Therefore, AGGRENOX reduces the risk of stroke by a further 22.1% when compared with ASA (p=0.008). The factorial analysis shows that the effect of DP and ASA in AGGRENOX are additive. Nearly twice as many events are avoided with AGGRENOX therapy than with ASA or ER-DP given alone, as compared with placebo. Primary survival analysis found no significant reduction in death either by ASA, DP, or AGGRENOX in patients with a recent ischemic stroke or TIA.

*After publication of ESPS-2, the data was re-analyzed for use with regulatory authorities in North America. The results presented here reflect the results of this re-analysis, which will explain some minor discrepancies between the numerical values reported here and those reported in the publications of this study. The re-analysis did not affect the significance of any of the results.

TABLE 1: SUMMARY OF FIRST STROKE (FATAL OR NON-FATAL): STUDY ESPS-2

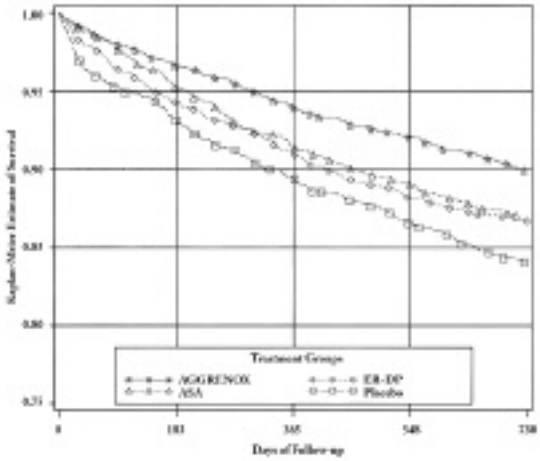
	Total Number of Patients N	Number of Patients with Stroke within 2 Years - N (%)	Kaplan-Meier Stroke- Free Survival at 2 Years % - (95% C.I.)
Factorial Analysis Groups			
ER-DP (AGGRENOX, ER-DP alone)	3304	368 (11.1)	88.3 (87.2, 89.4)
No ER-DP (ASA alone, placebo)	3298	456 (13.8)	85.6 (84.3, 86.8)
ASA (AGGRENOX, ASA alone)	3299	363 (11.0)	88.5 (87.4, 89.6)
No ASA (ER-DP alone, placebo)	3303	461 (14.0)	85.4 (84.1, 86.6)
Individual Treatment Groups (b.i.d.)			
AGGRENOX	1650	157 (9.5)	89.9 (88.4, 91.4)
ER-DP	1654	211 (12.8)	86.7 (85.0, 88.4)
ASA	1649	206 (12.5)	87.1 (85.4, 88.7)
Placebo	1649	250 (15.2)	84.1 (82.2, 85.9)

	P-Value*	Risk Reduction (%) at 2 Years	Odds Reduction (%) (95% C.I.)
Factorial Analysis Groups			
ER-DP vs. No ER-DP	0.001	18.9	22 (9, 32)
ASA vs. No ASA	<0.001	21.2	24 (12, 34)
ER-DP x ASA Interaction	0.850	-	-
Pairwise Treatment Groups			
AGGRENOX vs. placebo	<0.001	36.8	41 (27, 52)
ER-DP vs. placebo	0.036	16.5	18 (0, 33)
ASA vs. placebo	0.009	18.9	20 (3, 34)

* P-values from planned Gehan-Wilcoxon survival analysis.
Note: ER-DP = Extended Release Dipyridamole 400 mg/day; ASA = Acetylsalicylic Acid 50 mg/day.

The stroke-free survivor outcome for AGGRENOX was superior to those for placebo, ER-DP alone, and ASA alone throughout the follow-up period (Figure 1).

FIGURE 1: FIRST STROKE (FATAL OR NON-FATAL): STUDY ESPS-2 KAPLAN-MEIER SURVIVOR FUNCTION FOR EACH TREATMENT GROUP



Note: ER-DP = Extended Release Dipyridamole 200 mg b.i.d.; ASA = Acetylsalicylic Acid 25 mg b.i.d.
Note: The dosage regimen for all treatment groups is b.i.d.

SECONDARY ENDPOINTS

Two separate secondary endpoints - TIA and OVE - strongly substantiated the individual and additive effectiveness of DP and ASA, as previously demonstrated by the primary analyses of stroke. Although the patient number with OVE was very small in all treatment groups, it was demonstrated that both DP and ASA produced significant reductions in TIA and OVE, and had additive effects in combination. Compared with placebo, AGGRENOX capsules reduced the (adjusted) odds of 1 TIA by 40% and reduced the odds of OVE by 62%. DP and ASA also produced significant reductions in the protocol-specified secondary ischemic events endpoint, and these effects were additive in AGGRENOX. The results were primarily driven by the dominant stroke component. For acute MI, the only suggested effect was a 21% (95% C.I. -8% to 42%) odds reduction on ASA vs. no ASA.

INDICATIONS AND CLINICAL USE

AGGRENOX is indicated for the prevention of stroke in patients who have had a previous stroke or a transient ischemic attack (TIA).

CONTRAINDICATIONS

AGGRENOX is contraindicated in patients with hypersensitivity to dipyridamole, ASA or any of the other product components. Due to the ASA component, AGGRENOX is also contraindicated in patients with known allergy to nonsteroidal anti-inflammatory drug products and in patients with the syndrome of asthma, rhinitis, and nasal polyps.

WARNINGS

ALCOHOL WARNING: Patients who consume three or more alcoholic drinks every day should be counseled about the bleeding risks involved with chronic, heavy alcohol use while taking AGGRENOX, due to the ASA component.

PEPTIC ULCER DISEASE: Patients with a history of active peptic ulcer disease should avoid using AGGRENOX, which can cause gastric mucosal irritation, and bleeding, due to the ASA component.

PEDIATRIC USE: Safety and effectiveness of AGGRENOX in pediatric patients has not been studied. Therefore, AGGRENOX should not be used in pediatric patients.

PREGNANCY: There are no adequate and well-controlled studies of AGGRENOX in pregnant women. Because animal reproduction studies are not always predictive of human response, AGGRENOX should be given during the first two trimesters of pregnancy only if the potential benefit to the mother justifies the potential risk to the fetus. Due to the ASA component, AGGRENOX should not be prescribed during the third trimester of pregnancy.

PRECAUTIONS

GENERAL

AGGRENOX should be used with caution in patients with severe coronary artery disease (e.g., unstable angina or recently sustained myocardial infarction), due to the vasodilatory effect of the dipyridamole component. Chest pain may be aggravated in patients with underlying coronary artery disease who are receiving dipyridamole. Patients being treated with AGGRENOX should not receive additional intravenous dypyridamole. If pharmacological stress testing with intravenous dipyridamole for coronary artery disease is considered necessary, then AGGRENOX should be discontinued twenty-four hours prior to testing, otherwise the sensitivity of the intravenous stress test could be limited.

For stroke or TIA patients for whom ASA is indicated to prevent recurrent myocardial infarction (MI) or angina pectoris, the dose of ASA in AGGRENOX has not been proven to provide adequate treatment for these cardiac indications.

ASA should not be used in children or teenagers for viral infections, with or without fever, because of the risk of Reye's syndrome with concomitant use of ASA in certain viral illnesses.

Due to the ASA component, AGGRENOX should be avoided in patients with severe renal failure (glomerular filtration rate less than 10 mL/min) and in patients with severe hepatic insufficiency.

AGGRENOX should be used with caution in patients with inherited (hemophilia) or acquired (liver disease or vitamin K deficiency) bleeding disorders, due to the fact that even low doses of ASA can inhibit platelet function leading to an increase in bleeding time.

GI side effects include stomach pain, heartburn, nausea, vomiting, diarrhea, and gross GI bleeding. Although minor upper GI symptoms, such as dyspepsia, are common and can occur anytime during therapy, physicians should remain alert for signs of ulceration and bleeding, even in the absence of previous GI symptoms. Physicians should inform patients about the signs and symptoms of GI side effects and what steps to take if they occur.

CARCINOGENESIS AND IMPAIRMENT OF FERTILITY

Carcinogenesis: In carcinogenicity studies in rats and mice with the combination of dipyridamole and ASA at the ratio of 1:6 over a period of 125 and 105 weeks respectively, no significant tumorigenic effect was observed at maximum doses of 450 mg/kg (corresponding to a share of 75 mg/kg of dipyridamole, 9 times the maximum recommended daily human dose for a 50 kg person on a mg/kg basis [or 1.5-2.1 times on a mg/m^2 basis]), and 375 mg/kg ASA, 375 times the maximum recommended daily human dose for a 50 kg person on a mg/kg basis (or 58-83 times on a mg/m^2 basis).

Fertility: Fertility studies with dipyridamole revealed no evidence of impaired fertility in rats at oral dosages of up to 1,250 mg/kg, 156 times the maximum recommended human dose on a mg/kg basis for a 50 kg person (or 35 times on a mg/m^2 basis). ASA inhibits ovulation in rats.

NURSING MOTHERS

Dipyridamole and ASA are excreted in human breast milk in low concentrations. Therefore, caution should be exercised when AGGRENOX is administered to a nursing woman.

LABORATORY TESTS

ASA has been associated with elevated hepatic enzymes, blood urea nitrogen and serum creatinine, hyperkalemia, proteinuria and prolonged bleeding time. Over the course of the 24-month study (ESPS-2), patients treated with AGGRENOX showed a decline (mean change from baseline) in hemoglobin of 0.25 g/dl, hematocrit of 0.75%, and erythrocyte count of 0.13 x 10^6/mm^3.

DRUG INTERACTIONS

Adenosine: Dipyridamole has been reported to increase the plasma levels and cardiovascular effects of adenosine. Adjustment of adenosine dosage may be necessary.

Cholinesterase inhibitors: The dipyridamole component of AGGRENOX may counteract the anticholinesterase effect of cholinesterase inhibitors, thereby potentially aggravating myasthenia gravis.

The following drug interactions are associated with the ASA component of AGGRENOX:

Angiotensin converting enzyme (ACE) inhibitors: Due to the indirect effect of the ASA component on the renin-angiotensin conversion pathway, the hyponatremic and hypotensive effects of ACE inhibitors may be diminished by concomitant administration of AGGRENOX.

Acetazolamide: Due to the ASA component, concurrent use of AGGRENOX and acetazolamide can lead to high serum concentrations of acetazolamide (and toxicity) due to competition at the renal tubule for secretion.

Anticoagulant therapy (heparin and warfarin): Patients on anticoagulation therapy are at increased risk for bleeding because of drug-drug interactions and effects on platelets. ASA can displace warfarin from protein binding sites, leading to prolongation of both the prothrombin time and the bleeding time. The ASA component of AGGRENOX can increase the anticoagulant activity of heparin, increasing bleeding risk.
Anticonvulsants: The ASA component of AGGRENOX can displace protein-bound phenytoin and valproic acid, leading to a decrease in the total concentration of phenytoin and an increase in serum valproic acid levels.
Beta blockers: The hypotensive effects of beta blockers may be diminished by the concomitant administration of AGGRENOX due to inhibition of renal prostaglandins by ASA, leading to decreased renal blood flow and salt and fluid retention.
Diuretics: The effectiveness of diuretics in patients with underlying renal or cardiovascular disease may be diminished by the concomitant administration of AGGRENOX due to inhibition of renal prostaglandins by ASA, leading to decreased renal blood flow and salt and fluid retention.
Methotrexate: The ASA component of AGGRENOX can inhibit renal clearance of methotrexate, leading to bone marrow toxicity, especially in the elderly or renally impaired.
Nonsteroidal anti-inflammatory drugs (NSAIDs): Due to the ASA component, the concurrent use of AGGRENOX with other NSAIDs may increase bleeding or lead to decreased renal function.
Oral hypoglycemics: AGGRENOX may increase the effectiveness of oral hypoglycemic drugs, leading to hypoglycemia.
Uricosuric agents (probenecid and sulfinpyrazone) and natriuretic agents: The ASA component of AGGRENOX antagonizes the uricosuric action of uricosuric agents. ASA decreased the natriuretic effect of spironolactone in healthy volunteers.
Ibuprofen: The concomitant administration of ibuprofen in healthy volunteers shortened the platelet aggregation inhibitory effect of ASA.

ADVERSE REACTIONS

A 24-month, multicenter, double-blind, randomized study (ESPS-2) was conducted to compare the efficacy and safety of AGGRENOX with placebo, extended release dipyridamole alone and ASA alone. The study was conducted in a total of 6,602 male and female patients who had experienced a previous ischemic stroke or transient ischemia of the brain within three months prior to randomization.
Table 2 presents the incidence of adverse events that occurred in 1% or more of patients treated with AGGRENOX where the incidence was also greater than those patients treated with placebo. Discontinuation due to adverse events in ESPS-2 was 27.8% for AGGRENOX, 28.2% for extended release dipyridamole, 23.2% for ASA, and 23.7% for placebo.

TABLE 2: INCIDENCE OF ADVERSE EVENTS IN ESPS-2*

	Individual Treatment Group			
Body System/Preferred Term	AGGRENOX	ER-DP Alone	ASA Alone	Placebo
Total Number of Patients	1650	1654	1649	1649
Total Number (%) of Patients With at Least One On-Treatment Adverse Event	1319 (79.9%)	1305 (78.9%)	1323 (80.2%)	1304 (79.1%)
Central & Peripheral Nervous System Disorders				
Headache	647 (39.2%)	634 (38.3%)	558 (33.8%)	543 (32.9%)
Convulsions	28 (1.7%)	15 (0.9%)	28 (1.7%)	26 (1.6%)
Gastro-Intestinal System Disorders				
Dyspepsia	303 (18.4%)	288 (17.4%)	299 (18.1%)	275 (16.7%)
Abdominal Pain	289 (17.5%)	255 (15.4%)	262 (15.9%)	239 (14.5%)
Nausea	264 (16.0%)	254 (15.4%)	210 (12.7%)	232 (14.1%)
Diarrhea	210 (12.7%)	257 (15.5%)	112 (6.8%)	161 (9.8%)
Vomiting	138 (8.4%)	129 (7.8%)	101 (6.1%)	118 (7.2%)
Hemorrhage Rectum	26 (1.6%)	22 (1.3%)	16 (1.0%)	13 (0.8%)
Melena	31 (1.9%)	10 (0.6%)	20 (1.2%)	13 (0.8%)
Hemorrhoids	16 (1.0%)	13 (0.8%)	10 (0.6%)	10 (0.6%)
GI Hemorrhage	20 (1.2%)	5 (0.3%)	15 (0.9%)	7 (0.4%)
Body as a Whole – General Disorders				
Pain	105 (6.4%)	88 (5.3%)	103 (6.2%)	99 (6.0%)
Fatigue	95 (5.8%)	93 (5.6%)	97 (5.9%)	90 (5.5%)
Back Pain	76 (4.6%)	77 (4.7%)	74 (4.5%)	65 (3.9%)
Accidental Injury	42 (2.5%)	24 (1.5%)	51 (3.1%)	37 (2.2%)
Malaise	27 (1.6%)	23 (1.4%)	26 (1.6%)	22 (1.3%)
Asthenia	29 (1.8%)	19 (1.1%)	17 (1.0%)	18 (1.1%)
Syncope	17 (1.0%)	13 (0.8%)	16 (1.0%)	8 (0.5%)
Psychiatric Disorders				
Amnesia	39 (2.4%)	40 (2.4%)	57 (3.5%)	34 (2.1%)
Confusion	18 (1.1%)	9 (0.5%)	22 (1.3%)	15 (0.9%)
Anorexia	19 (1.2%)	17 (1.0%)	10 (0.6%)	15 (0.9%)
Somnolence	20 (1.2%)	13 (0.8%)	18 (1.1%)	9 (0.5%)
Musculo-Skeletal System Disorders				
Arthralgia	91 (5.5%)	75 (4.5%)	91 (5.5%)	76 (4.6%)
Arthritis	34 (2.1%)	25 (1.5%)	17 (1.0%)	19 (1.2%)
Arthrosis	18 (1.1%)	22 (1.3%)	13 (0.8%)	14 (0.8%)
Myalgia	20 (1.2%)	16 (1.0%)	11 (0.7%)	11 (0.7%)
Respiratory System Disorders				
Coughing	25 (1.5%)	18 (1.1%)	32 (1.9%)	21 (1.3%)
Upper Respiratory Tract Infection	16 (1.0%)	9 (0.5%)	16 (1.0%)	14 (0.8%)
Cardiovascular Disorders, General				
Cardiac Failure	26 (1.6%)	17 (1.0%)	30 (1.8%)	25 (1.5%)
Platelet, Bleeding & Clotting Disorders				
Hemorrhage NOS	52 (3.2%)	24 (1.5%)	46 (2.8%)	24 (1.5%)
Epistaxis	39 (2.4%)	16 (1.0%)	45 (2.7%)	25 (1.5%)
Purpura	23 (1.4%)	8 (0.5%)	9 (0.5%)	7 (0.4%)
Any Bleeding**	144 (8.7%)	77 (4.7%)	135 (8.2%)	74 (4.5%)
Severity of bleeding:***				
Mild	84 (5.1%)	53 (3.2%)	82 (5.0%)	52 (3.2%)
Moderate	33 (2.0%)	18 (1.1%)	33 (2.0%)	15 (0.9%)
Severe	23 (1.4%)	4 (0.2%)	19 (1.2%)	5 (0.3%)
Fatal	4 (0.2%)	2 (0.1%)	1 (0.1%)	2 (0.1%)
Neoplasm				
Neoplasm NOS	28 (1.7%)	16 (1.0%)	23 (1.4%)	20 (1.2%)
Red Blood Cell Disorders				
Anemia	27 (1.6%)	16 (1.0%)	19 (1.2%)	9 (0.5%)

* Reported by >1% of patients during AGGRENOX treatment where the incidence was greater than those treated with placebo.
** Bleeding at any site, reported during follow-up and within 15 days after eventual stroke or treatment cessation.
*** Severity of bleeding: mild = requiring no special treatment; moderate = requiring specific treatment but no blood transfusion; severe = requiring blood transfusion.
Note: ER-DP = Extended Release Dipyridamole 400 mg/day; ASA = Acetylsalicylic Acid 50 mg/day.
Note: The dosage regimen for all treatment groups is b.i.d.
Note: NOS = not otherwise specified

Rare Adverse Reactions:

Adverse reactions that occurred in less than 1% of patients treated with AGGRENOX in the ESPS-2 study and that were medically judged to be possibly related to either dipyridamole or ASA are listed below.
Body as a Whole: allergic reaction, fever
Cardiovascular: hypotension, flushing
Central Nervous System: coma, dizziness, paraesthesia
Gastrointestinal: gastritis, ulceration and perforation
Hearing & Vestibular Disorders: tinnitus, and deafness. Patients with high frequency hearing loss may have difficulty perceiving tinnitus. In these patients, tinnitus cannot be used as a clinical indicator of salicylism
Heart Rate and Rhythm Disorders: tachycardia, palpitation, arrhythmia, supraventricular tachycardia
Liver and Biliary System Disorders: cholelithiasis, jaundice, abnormal hepatic function
Metabolic & Nutritional Disorders: hyperglycemia, thirst
Platelet, Bleeding and Clotting Disorders: hematoma, gingival bleeding, cerebral hemorrhage, intracranial hemorrhage, subarachnoid hemorrhage
Note: There was one case of pancytopenia recorded in a patient within the AGGRENOX treatment group, from which the patient recovered without discontinuation of AGGRENOX.
Psychiatric Disorders: agitation
Reproductive: uterine hemorrhage
Respiratory: hypernea, asthma, bronchospasm, hemoptysis, pulmonary edema
Special Senses: taste loss
Skin and Appendages Disorders: pruritus, urticaria
Urogenital: renal insufficiency and failure, hematuria

POST-MARKETING EXPERIENCE

The following is a list of additional adverse reactions that have been reported either in the literature or are from post-marketing spontaneous reports for either dipyridamole or ASA.
Body as a Whole: hypothermia
Cardiovascular: angina pectoris, worsening of symptoms of coronary heart disease
Central Nervous System: cerebral edema
Fluid and Electrolyte: hyperkalemia, metabolic acidosis, respiratory alkalosis
Gastrointestinal: pancreatitis, Reyes Syndrome
Hearing and Vestibular Disorders: hearing loss
Hypersensitivity: acute anaphylaxis, laryngeal edema
Liver and Biliary System Disorders: hepatitis, incorporated into gallstones
Musculoskeletal: rhabdomyolysis
Metabolic & Nutritional Disorders: hypoglycemia, dehydration
Blood, Platelet, Bleeding and Clotting Disorders: prolongation of the prothrombin time, prolongation of bleeding time, increased bleeding during and after surgery, disseminated intravascular coagulation, coagulopathy, thrombocytopenia
Reproductive: prolonged pregnancy and labor, stillbirths, lower birth weight infants, antepartum and postpartum bleeding
Respiratory: tachypnea
Skin and Appendages Disorders: rash, alopecia, angioedema
Urogenital: interstitial nephritis, papillary necrosis, proteinuria

Laboratory Changes

Over the course of the 24-month study (ESPS-2), patients treated with AGGRENOX showed a decline (mean change from baseline) in hemoglobin of 0.25 g/dl, hematocrit of 0.75%, and erythrocyte count of 0.13 x 10^6/mm^3.

DOSAGE AND ADMINISTRATION

For oral administration. The recommended dose of AGGRENOX is one capsule twice daily, one in the morning and one in the evening, with or without food. The capsules should be swallowed whole without chewing.

AVAILABILITY OF DOSAGE FORMS

AGGRENOX is available as a hard gelatin capsule, with a red cap and an ivory-coloured body, containing yellow extended release pellets incorporating dipyridamole and a round white tablet incorporating immediate-release ASA. The capsule body is imprinted in red with the Boehringer Ingelheim logo and with "01A".
AGGRENOX is supplied in polypropylene tubes containing 60 capsules. Schedule F.

Product Monograph available upon request.

Boehringer Ingelheim

Boehringer Ingelheim (Canada) Ltd.
5180 South Service Rd.,
Burlington (Ontario) L7L 5H4
www.boehringer-ingelheim.ca

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press

41st meeting of the Canadian Congress of Neurological Sciences
PROGRAM

Tuesday, June 13, 2006

07:00-18:00	**Speaker Preparation**
07:00-20:00	**Registration Open**
07:30-08:00	CJNS Audit Committee Meeting
08:00-09:00	CCNS Audit Committee Meeting
08:00-17:30	Neurobiology Review Course
08:30-16:00	**ALS Strategies for Quality Life/Quality Care Symposium**
09:00-11:00	CCNS Professional Development Committee
10:00-12:00	CCNS Scientific Program Committee
12:00-13:15	Neurology Residents' Business Meeting
12:00-13:30	CJNS Board Meeting
13:30-16:00	CCNS Board Meeting
12:00-17:00	Canadian Headache Outpatient Registry & Database Meeting
12:30-16:30	CNS – Education and Manpower Committee, Royal College Specialty Committee Meeting – Neurology, Royal College Neuro Nucleus Committee Meetings
16:30-18:00	CNS Council Meeting
17:30-18:30	Neurosurgery Residents' Business Meeting
17:30-18:30	Canadian Epilepsy Research Initiative
18:00-21:00	ALS Research Consortium Meeting
18:30-21:00	**Headache Dinner Session**
18:30-21:00	**Epilepsy Video Dinner Session**

Wednesday, June 14, 2006

06:30-08:00	CSCN EMG Committee Meeting
07:00-08:00	Canadian Headache Society AGM
07:00-18:00	**Speaker Preparation**
07:00-20:00	**Registration Open**
08:00-12:00	**Scientific and Technical Advances in Epilepsy Course**
08:00-12:00	**Managing Spasticity Course**
08:00-12:00	**Movement Disorders Course**
08:00-12:00	**Advances in Neuro-oncology Course**
08:00-12:00	**Cadaveric Peripheral Nerve Dissection Course (off-site)**
08:00-12:00	**EMG Workshop**
08:00-16:00	**Exhibitor Set-up**
12:00-13:00	Canadian Neuromuscular Group Meeting
12:00-13:00	Canadian Movement Disorders Group AGM
12:00-13:00	CSCN EEG Committee Meeting
13:00-15:00	CJNS Editorial Board Meeting
13:30-17:30	**Trigeminal Neuralgia and Cluster Headache Course**
13:30-17:30	**Management of Severe Neurological Illness (Neurocritical Care)**
13:30-17:30	**Practical Issues in Brain Tumour Treatment**
13:30-17:30	**Neuromuscular Course**
15:00-16:30	CJNS Publications Committee Meeting
16:00-17:30	CNSS Council Meeting
17:00-18:00	Canadian Epilepsy Consortium Board Meeting
17:00-20:00	**Exhibit Hall open**
17:30-18:15	Neurology and Neurosurgery Residents' Soirée
18:00-20:00	Welcome Reception

Thursday, June 15, 2006

06:30-08:00	Canadian Epilepsy Consortium AGM
07:00-08:00	CBRET Meeting
07:00-08:00	CSCN Council Meeting
07:00-08:00	CCNS Affiliate Societies Meeting
07:00-18:00	**Registration Open**
07:00-18:00	**Speaker Preparation**
07:30-08:30	**Poster Set-up**
08:30-10:30	**Plenary Session I: Scientific and Technical Advances in the Clinical Neurosciences**
11:00-13:00	**Platform Sessions**
11:00-19:00	**Exhibits/Posters in Exhibit Hall**
13:00-14:30	**Lunch in Exhibit Hall**
13:30-14:30	Pediatric Neurosurgeon's Study Group
14:30-16:00	**Plenary Session II: Health Care Issues**
16:00-17:30	**Platform Sessions**
17:30-18:30	Canadian League Against Epilepsy Board Meeting
17:30-19:00	**Expert-led Poster Tours (Authors' standby)**
19:00-21:00	**Update on New and Emerging Therapies for Alzheimer Disease Dinner Session**

Friday, June 16, 2006

07:00-08:30	Canadian League Against Epilepsy Meeting
07:00-18:00	**Speaker Preparation**
07:00-18:30	**Registration Open**
07:00-08:30	Royal College Specialty Committee Meeting – Neurosurgery
07:30-08:30	Canadian Neurocritical Care Group Meeting
07:30-08:30	CNS Foundation Meeting
08:30-10:30	**Plenary Session III: Stroke**
10:30-15:00	**Exhibits/Posters in Exhibit Hall**
10:30-12:00	Canadian Brain and Nerve Health Coalition Meeting
11:00-13:00	**Platform Sessions**
13:00-14:30	**Lunch in Exhibit Hall**
13:30-14:30	CSCN AGM
14:30-15:00	**Poster removal**
14:30-16:30	**Grand Rounds**
16:30-18:00	CNS AGM
16:30-18:00	CNSS AGM
18:30-20:30	Sucrerie de la Montagne Social

Saturday, June 17, 2006

07:00-12:00	**Speaker Preparation**
07:00-14:00	**Registration Open**
08:30-12:00	**What's New in the Clinical Neurosciences**
08:30-15:30	**Designing an Optimal Clinical Trial for Multiple Sclerosis**
08:30-17:00	**Controversies in Stroke Management Course**
09:00-10:00	CJNS Board Meeting
10:00-11:00	CCNS Board Meeting
11:00-12:00	Liaison/CCNS Board Meeting
15:30-18:30	Canadian Network of MS Clinics

https://doi.org/10.1017/S0317167100017042 Published online by Cambridge University Press