



SATURDAY, MARCH 18 2017
McIntyre Building, McGill University

SYMPOSIUM DE NEUROLOGIE
Samedi 18 mars 2017
Bâtiment McIntyre, Université McGill



The Student Neurology Symposium aims to reach students who cultivate an interest for neurology in a day of workshops, plenary and parallel sessions where participants will discover the many practical and theoretical aspects of neurology.

We offer students the unique opportunity to assist to conferences that will challenge many common conceptions of neurology. Nationally and internationally renowned staff neurologists, neurosurgeons, bioethics philosophers and other neuroscientists are invited to share their knowledge and passion with students every year.

Le Symposium Étudiant de Neurologie vise à remettre en question la conception de la neurologie chez les étudiants en médecine et de stimuler l'intérêt local avec une journée d'ateliers et conférences où les participants pourront découvrir les divers aspects pratiques et théoriques de la neurologie.

Nous offrons aux étudiants l'occasion unique d'assister à des conférences par des spécialistes de renommée internationale, dont des neurologues, neurochirurgiens et spécialistes de la neuro-éthique, invités à partager leurs connaissances et leur passion avec les étudiants chaque année.

Ariane Veilleux-Carpentier

Bing Yu Chen

Catherine Veilleux

Eunice You

Karl Grenier

Sandra Reiter-Campeau

Shriya Deshmukh

Yi Tong

Yujin Kang

Where - McGill University, McIntyre Medical Building
When - March 18th, 2017, 8:30AM to 5:30 PM

When?	Where?	Symposium Schedule
8:30 AM – 9:30 AM	6 th floor	Registration & Breakfast
9:30 AM – 10:15 AM	522	Plenary Session <ul style="list-style-type: none"> • Dr. Lesley Fellows – Neurology & Cognition
10:30 AM – 11:15 AM	522 504	Parallel Talks <ul style="list-style-type: none"> • Dr. Alexandre Y. Poppe – Vascular Neurology • Dr. Eric Racine - Neuroethics
11:30 AM – 12:15PM	504 522	Parallel Talks <ul style="list-style-type: none"> • Dr. Denis Sirhan – Neurosurgery • Dr. Dang K. Nguyen – Non-epileptic seizures
12:15 PM – 12:45 PM	6 th floor	Lunch
12:45 PM – 1:45 PM	6 th floor	NeuroBowl
1:45 PM – 2:30 PM	201 202 208/209 203 210/211	Parallel Skills Workshop <ul style="list-style-type: none"> • Neurological physical exam – The Basics • Neurological physical exam – Advanced • EMG and Clinical Cases • Stroke and the NIHSS • Neuroradiology
2:45 PM – 3:30PM	201 202 208/209 203 210/211	Parallel Skills Workshop <ul style="list-style-type: none"> • Neurological physical exam – The Basics • Neurological physical exam – Advanced • EMG and Clinical Cases • Stroke and the NIHSS • Neuroradiology
3:45 PM – 4:30 PM	210/211	Meet the Residents and Program Directors
4:30 PM – 5:30 PM	6 th floor	Poster Competition & Closing Cocktail



Student Interest Group in Neurology



Association des neurologues du Québec BPA

Wealth
Dominic Bolwert



Alumni Association

Où? - McGill University, McIntyre Medical Building
Quand? – 18 mars, 2017, 8h30 à 17h30

Quand?	Où?	Horaire du Symposium Schedule
8h30 – 9h30	6 ^e étage	Inscription & déjeuner
9h30 – 10h15	522	Plénière <ul style="list-style-type: none"> • Dre Lesley Fellows – La Neurologie & la Cognition
10h30 – 11h15	522 504	Conférences Parallèles 1 <ul style="list-style-type: none"> • Dr Alexandre Y. Poppe – Neurologie Vasculaire • Dr Éric Racine – Neuro-éthiques
11h30 – 12h15	504 522	Conférences Parallèles 2 <ul style="list-style-type: none"> • Dr Denis Sirhan – Neurochirurgie • Dr Dang K. Nguyen – Convulsions non-épileptiques
12h15 – 12h45	6 ^e étage	Dîner
12h45 – 13h45	6 ^e étage	NeuroBowl
13h45 – 14h30	201 202 208/209 203 210/211	Ateliers pratiques 1 <ul style="list-style-type: none"> • L'examen neurologique - Les Bases • L'examen neurologique - Avancé • EMG et cas cliniques • AVC et le NIHSS • Neuroradiologie
14h45 – 15h30	201 202 208/209 203 210/211	Ateliers pratiques 2 <ul style="list-style-type: none"> • L'examen neurologique - Les Bases • L'examen neurologique - Avancé • EMG et cas cliniques • AVC et le NIHSS • Neuroradiologie
15h45 – 16h30	210/211	Rencontre avec les résidents et directeurs de programme
16h30 – 17h30	6 ^e étage	Présentation d'affiches et Cocktail



Plenary Talk
Plénière
9h30-10h15

Dr. Lesley Fellows – MD, DPhil



Professor in the department of Neurology and Neurosurgery, Staff Neurologist at the Montreal Neurological Hospital and Assistant Dean of Academic Affairs at the McGill Faculty of Medicine

Her research focuses on the brain basis of decision-making in humans, using the tools of cognitive neuroscience. She studies how focal brain damage or neurochemical dysfunction affects aspects of decision making, and the consequences of frontal lobe injury on executive function. Her talk will focus on the area of neurology and cognition.

Professeure au département de neurologie et de neurochirurgie, neurologue à l'Hôpital Neurologique de Montréal et vice-doyenne adjointe aux affaires universitaires de la Faculté de Médecine de McGill.

Elle s'intéresse aux mécanismes neurologiques qui sont à la base de la prise de décision chez les humains. Sa recherche se penche aussi sur les conséquences des dommages aux lobes frontaux sur les fonctions exécutives et cognitives, ainsi qu'à l'impact des blessures locales et des dysfonctionnements neurochimiques. Sa conférence traitera de la recherche en neurologie cognitive.

Parallel Talks // Conférences en parallèle

#1 : 10h30 – 11h15

#2 : 11h30 – 12h15

Dr. Eric Racine – PhD



Director of the Neuroethics Research Unit at the IRCM and Adjunct Professor in the Departments of Medicine and of Neurology & Neurosurgery at McGill University.

His work is focused on the ethical considerations of patient care and research practices in clinical and basic neuroscience. His research interests include the ethical approach to end-of-life decisions for patients with severe neurological conditions, as well as the ethics of deep-brain stimulation and cognitive enhancement. His talk will be an introduction to neuro-ethics, with a focus on the applications of neuroethical principles in the areas of deep brain stimulation and fMRI imaging.

Directeur de l'unité de recherche en neuroéthique de l'IRCM et professeur associé du Département de médecine et de neurologie et neurochirurgie, Université McGill

Son travail est axé sur les aspects éthiques des soins aux patients et sur la recherche en neurosciences clinique et fondamentale. Ses intérêts en recherche incluent l'approche des décisions de fin de vie pour les patients atteints de troubles neurologiques sévères et l'éthique de la stimulation cérébrale profonde. Sa présentation intitulée « Introduction à la neuroéthique » portera notamment sur l'application de principes éthiques dans l'utilisation de la stimulation cérébrale profonde et du fMRI.

Introduction to neuroethics

With advances in the behavioural and brain sciences, a new field of ethics, “neuroethics”, has emerged as an interdisciplinary response to important ethical dilemmas associated with research, health care delivery, and health policy. The field also attempts to capture insights from neuroscience to inform how we view ethics. This workshop will introduce to the history and development of neuroethics. Then, two examples of clinical practices and related research areas where the speaker has been active will be summarized and discussed with participants: (1) the use of deep brain stimulation in Parkinson's disease and in neuropsychiatric conditions and (2) the use of fMRI in disorders of consciousness. The final part of the workshop will focus on how neurologists can further contribute to the development of neuroethics.

- Provide an overview of the field of neuroethics;
- Describe some current areas of ethical controversy;
- Engage the audience in reflection notably on the contribution of neurologists to neuroethics.

Dr Alexandre Y Poppe – MDCM, FRCPC



Stroke neurologist at Notre-Dame Hospital

Dr. Poppe is a stroke neurologist with particular interests for stroke in the young, CNS vasculitis, and acute stroke treatment, namely thrombectomy research. He is also an advocate for FAST patient care by helping raise awareness of the signs of stroke. His talk will focus on life as a stroke neurologist, as well as cases of strokes in young patients.

Neurologue vasculaire à l'Hopital Notre-Dame du CHUM

Dr. Poppe est un neurologue vasculaire qui s'intéresse aux AVC chez les jeunes adultes, aux vasculites du système nerveux central, ainsi qu'au traitement de l'AVC. Dr Poppe contribue également à sensibiliser la population aux signes de l'AVC pour assurer une prise en charge rapide et efficace des personnes atteintes. Sa présentation portera sur la spécialité neurovasculaire, ainsi que les cas d'AVC chez les jeunes adultes.

La thrombectomie pour l'AVC aigu: une nouvelle ère en neurologie (in French)

- 1) décrire l'évidence scientifique qui supporte l'efficacité de la thrombectomie en AVC
- 2) décrire le rôle du neurologue dans l'administration de cette thérapie
- 3) souligner les défis d'implantation qui demeurent pour la thrombectomie

Dr Denis Sirhan – MD



Neurosurgeon at the Montreal Neurological Hospital and Head of the Cerebrovascular Service at The Neuro

Dr. Denis Sirhan is a neurosurgeon who specializes in skullbase approaches for complex tumours, and performs endoscopic surgery for pituitary and anterior basal lesions. His practice also covers a wide range of neurosurgical disorders such as cerebral aneurysms, AVMs, large adult hydrocephalus and microvascular decompressions for neuralgias.

His talk is entitled "Recent Advances in Skullbase Surgery: what have we gained?"

Neurochirurgien et chef du service neurovasculaire de l'Hôpital Neurologique de Montréal

Dr. Sirhan est un neurochirurgien spécialisé en approches de la base du crâne dans les résections de tumeurs complexes et en chirurgie endoscopique pour les lésions hypophysaires. Dr. Sirhan traite un large éventail de troubles neurochirurgicaux comme les anévrismes cérébraux, les MAV, l'hydrocéphalie et les névralgies. Sa conférence est intitulée «Recent Advances in Skullbase Surgery: what have we gained? »

Dr Dang K. Nguyen – MD, Ph.D., FRCPC



Epileptologist at Notre-Dame Hospital and President of the Canadian League against Epilepsy

Dr Nguyen is a neurologist specialized in epilepsy, with research interests on the study of intractable non-lesional epilepsies and insular epilepsies.

At the Symposium, Dr Nguyen will be discussing another of his passions: psychogenic non-epileptic seizures and how to differentiate these from epileptic seizures to avoid misdiagnosis, supported by a series of patient videos.

Neurologue spécialiste en épilepsie à l'Hôpital Notre-Dame du CHUM et Président de la Ligue Canadienne contre l'Épilepsie

Dr Nguyen est un neurologue spécialisé en épilepsie, dont les centres d'intérêts en recherche sont les épilepsies pharmaco-résistantes non-lésionnelles et les épilepsies insulaires.

Lors du symposium, Dr Nguyen discutera des convulsions psychogènes non-épileptiques et comment les différencier des convulsions épileptiques pour éviter des erreurs diagnostiques. Sa conférence inclura une série de vidéos de patients.

NeuroBowl

12h45 – 13h45



Inspired by the annual competition happening each year at the meeting of the American Association of Neurology, this trivia quiz will be a competition between the four medical faculties of Quebec. Right after lunch, four teams, each representing a faculty, will face off for the Symposium trophy.

Questions will be on many subjects of neurology and will test knowledge of both clinical and basic science facts.

Team composition: 4 members per school

Inspiré par la compétition annuelle ayant lieu dans le cadre de la conférence de l'Académie américaine de neurologie, ce quiz organisé tout juste après l'heure du dîner sera une compétition entre les quatre facultés de médecine du Québec. Chacune sera représentée par une équipe, et le gagnant repartira avec le trophée du symposium!

Les questions porteront sur différents sujets de la neurologie et testeront les connaissances cliniques et scientifiques.

Composition des équipes : 4 personnes par université

Parallel Workshops

Ateliers Pratiques

#1: 13h45 – 14h30

#2: 14h45 – 15h30

N.B. Please attend the workshop that has been assigned to you for each of the two timeslots. Thank you for your cooperation.

Neurological Exam: The Basics

By Myriam Lévesque-Roy MDCM, PGY3, Adult Neurology, McGill University

This session will present the basics of the neurological exam. You will have the chance to practice your skills, under the guidance of a neurology resident.

Cette session présentera les bases de l'examen neurologique. Vous pourrez pratiquer sous la tutelle d'une résidente en neurologie.

Neurological Exam: Advanced

By Hisham Aldhukair MD, PGY3, Adult Neurology, McGill University

If you've already mastered the basics, this session will teach you more advanced points of the neurological exam, along with tips and tricks from neurology residents.

Si vous avez déjà maîtrisé les bases, les résidents en neurologie pourront vous enseigner divers autres trucs et astuces de l'examen neurologique utilisé en clinique.

EMG and Clinical Cases

By Adil Harroud MD, PGY3, Adult Neurology, McGill University

Demystify the indications and interpretation of EMGs, and discover its use through interesting clinical cases.

Démystifiez les indications et l'interprétation des EMG et découvrez leur utilisation dans le cadre de cas cliniques intéressants.

Strokes and the NIHSS

By Frédéric Potvin, PGY4, Adult Neurology, Université de Montréal

This session will walk you through how to assess an acute stroke with the NIH Stroke Scale, a diagnostic and prognostic clinical tool.

Cette session vous guidera quant à l'utilisation de l'échelle développée par l'Institut américaine de la santé (le NIH) pour l'évaluation de l'AVC.

Neuroradiology

By Maria delPilar Cortes MD, Interventional Neuroradiologist, Montreal Neurological Hospital

Presented by Dr. Maria delPilar Cortes, interventional neuroradiologist at the MNI, this session will be an introduction to neuroradiology as a specialty and will include interesting neurology cases from the imaging standpoint.

Présentée par Dr. Maria delPilar Cortes, neuroradiologiste interventionniste, cette session se veut une introduction à la neuroradiologie en tant que spécialité et présentera plusieurs cas neurologiques d'un point de vue radiologique.

Meeting program directors and residents
Rencontre avec les directeurs de programmes et les résidents
15h45-16h30

You will be invited to walk around and talk to program directors and residents from different neurology residency programs.

Program directors and residents present are:

- Dr. Fraser Moore, Adult Neurology, McGill University
- Dr. Nicolas Jodoin, Adult Neurology, Université de Montréal
- One representative from Université Laval - Adult Neurology,
- Ann-Marie Beaudoin, Adult Neurology Resident, Université de Sherbrooke

This session will be followed by a networking cocktail to conclude the day.

Vous serez invités à parler et à poser vos questions aux directeurs de programme de résidence et résidents en neurologie.

Les directeurs de programme présent seront

- Dr. Fraser Moore, Neurologie adulte, McGill University
- Dr. Nicolas Jodoin, Neurologie adulte, Université de Montréal
- Un(e) représentant(e) de l'Université Laval - Neurologie adulte
- Ann-Marie Beaudoin, Résidente en neurologie adulte, Université de Sherbrooke

Cette session sera suivie d'un cocktail pour conclure la journée en beauté !

Poster Competition
Compétition de Posters de Recherche
16h30-17h30

You will be invited to walk around and listen to the presentations by the students who have submitted their abstracts to the poster competition. The winner will be announced at the end of the day, during the cocktail. As a preview, here are the abstracts submitted.

Vous serez invités à vous promener et à en apprendre davantage sur les divers projets de recherche qu'ont menés plusieurs étudiants. Le gagnant sera annoncé durant le cocktail en fin de journée. Voici les résumés soumis au concours.

Theme: Aging, Dementia, Cognitive and Behavioural Neurology

Student Name: Marie-Andrée Coulombe

Abstract Title: Reduced functional connectivity of the periaqueductal gray is related to negative affect and clinical manifestations of fibromyalgia

Fibromyalgia syndrome (FM) is characterized by chronic widespread pain, muscle tenderness, and emotional distress. Previous studies found reduced endogenous pain modulation in FM. This deficiency of pain modulation may be related to the attributes of chronic pain and other clinical symptoms experienced in patients with FM. Thus, we tested whether there is a link between the clinical symptoms of FM and functional connectivity (FC) of the PAG, a key node of pain modulation. We acquired resting state 3T functional MRI data from 23 female patients with FM and 16 age- and sex- matched healthy controls (HC) and assessed FM symptoms with the Brief Pain Inventory, Fibromyalgia Impact Questionnaire, Hospital Anxiety and Depression Scale, and Pain Catastrophizing Scale. We found that patients with FM exhibit significant disruptions in PAG FC, particularly with brain regions implicated in negative affect, self-awareness and saliency. Specifically, we found that, compared to HCs, the FM patients had stronger PAG FC with the lingual gyrus and hippocampus but weaker PAG FC with regions associated with motor/ executive functions, the salience and default mode networks. The attenuated PAG FC was also negatively correlated with FIQ scores, and positively correlated with the magnification subscale of the PCS. These alterations were correlated with emotional and behavioral symptoms of FM. Our study implicates the PAG as a site of dysfunction contributing to the clinical manifestations and pain in FM.

Student Name: Caroline Dallaire-Théroux

Abstract Title: Braak neurofibrillary tangle staging prediction in Alzheimer's disease using in vivo MRI metrics

Objective: To predict post-mortem neurofibrillary degeneration associated with Alzheimer's disease (AD) from in vivo magnetic resonance imaging (MRI) measurements.

Method: Participants were selected from three databases (ADNI, NACC and Rush Memory and Aging Project) providing MRI scans and postmortem neuropathological data. After initial quality control, 194 subjects were retained. Surfaces, thicknesses and volumes from cortical and subcortical structures were segmented bilaterally from last MRI before death using FreeSurfer and transformed to normed metrics adjusted for sex, age, intracranial volume, manufacturer and magnetic field strength. Nonparametric analyses were performed to provide a predictive model of neurofibrillary staging as assessed by Braak score.

Results: Amongst all 234 radiological variables examined, 16 temporal (i.e., amygdala, hippocampus, inferior lateral ventricle, inferior temporal, entorhinal and perirhinal cortices, and fusiform and parahippocampal gyri) and one occipital structure (i.e., lateral occipital cortex) were significantly correlated with Braak stage ($p=.005$ significance threshold). We used these variables to build a predictive model using stepwise ordinal regression with backward elimination and 10-fold cross-validation. The best model included age at death and the normed scores of the left lateral occipital surface, and the left inferior lateral ventricle, right fusiform gyrus and right entorhinal cortex volumes. This model provided an accuracy of 57.7% for the prediction of Braak transentorhinal (I-II), limbic (III-IV) and isocortical (V-VI) stages.

Conclusion: Regional brain atrophy reflects underlying neurofibrillary degeneration and may be detectable using in vivo neuroimaging. MRI metrics may therefore be an avenue for prediction of AD pathological staging in the living brain.

Student Name: Rayane Zahal

Abstract Title: Atrophie différenciée de l'hippocampe antérieur et postérieur dans la démence sémantique et la maladie d'Alzheimer

La maladie d'Alzheimer (MA) est une maladie neurodégénérative, caractérisée par une atrophie au niveau de l'hippocampe, qui entraîne des altérations significatives et progressives de la mémoire épisodique. La MA affecte les fonctions cognitives, provoquant des modifications comportementales affectant les activités de la vie quotidienne. La démence sémantique (DS) est liée à la mémoire sémantique et affecte la production et la compréhension en préservant la mémoire épisodique. Des données montrent que la DS est caractérisée par une atrophie de l'hippocampe. Cette atrophie représente une contradiction dans la littérature, car elle est associée à la mémoire épisodique. Ceci mène à croire que les deux maladies sont liées à de différentes parties de l'hippocampe. Dans cette étude, l'utilisation de la Voxel-Based Morphometry (VBM) pour analyser les volumes de matière grise hippocampique a permis de localiser les atteintes spécifiques des dites maladies chez des groupes atteints de MA (n=13), de DS (n=9) en les comparant à un groupe contrôle (n=10). Les sujets ont été soumis à l'imagerie par résonance magnétique (IRM) structurale et à des tests neuropsychologiques et langagiers. Cette étude montre par le biais du Statistacal Parametric Mapping (SPM) une différence significative ($p<0,001$) pour le volume de matière grise au niveau de l'hippocampe antérieur pour le groupe

contrôle versus DS. Pour ce qui est de la MA, on observe une différence significative ($p < 0,005$) au niveau de l'hippocampe postérieur. En conclusion, l'atrophie est plus prononcée au niveau de l'hippocampe antérieur pour la DS et plus importante au niveau de l'hippocampe postérieur pour la MA.

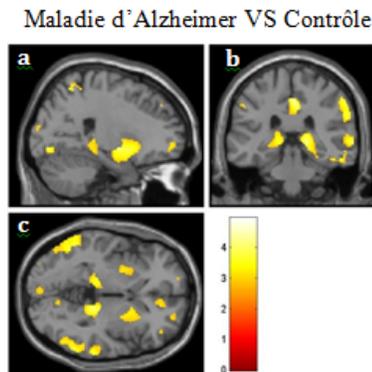


Fig. 1 Régions des différences significatives dans le volume de matière grise entre le groupe MA et CTRL vue d'une coupe latérale (a), coronale (b) et axiale (c). La figure a un seuil de significativité de $p < 0.005$ (non corrigé)

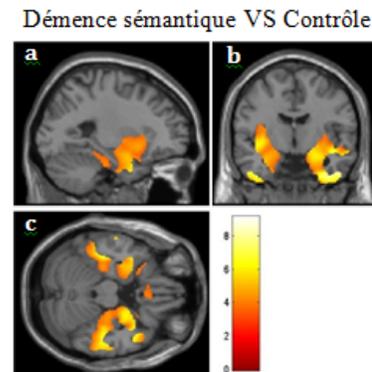


Fig. 2 Régions des différences significatives dans le volume de matière grise entre le groupe DS et CTRL vue d'une coupe latérale (a), coronale (b) et axiale (c). La figure a un seuil de significativité de $p < 0.001$ (non corrigé)

Student Name: Jane Zhang

Abstract Title: Pupillometry as a Vehicle to Elucidate Misdirection: Paying Attention to Magic

Magicians have developed powerful ways to modulate the subjective experience of their audiences. The techniques conjurers employ provide a robust way to study the modulation of attention and awareness. The present study examines how, despite multiple exposures, misdirection—diverting attention away from hidden elements—can yield a robust and sustainable effect. We ran 124 participants in four randomized versions featuring short, mute video clips displaying a magician performing variations of the classic Monte—a staple trick using three playing cards, a related pair and an oddball target, wherein the spectator needs to keep track of the location of the target—both with and without misdirection. Analyzing accuracy, confidence ratings, and pupillary response revealed that in the presence of misdirection participants reported inaccurate positions for the target concurrent with increase in pupil size after feedback regardless of the Monte version. Our findings suggest that rather than due to the misallocation of visual attention, misdirection seems to thrive on participants typically following rigid cognitive schemes and their inability to entertain alternative visual strategies although they are aware of the presence of misdirection.

Theme: Child and Developmental Neurology

Student Name: Sonia Anchouche

Abstract Title: Injury to the Pons in Asphyxiated Newborns Treated with Hypothermia

Birth asphyxia occurs in 1 to 10 of every 1,000 full-term births when the newborn brain's access to oxygen and/or blood supply is restricted. As of now, the only recognized treatment to mitigate these sequelae is induced therapeutic hypothermia which correlates with improved brain metabolism and prevents the development of some brain injury, but unfortunately not all of them. Magnetic Resonance Imaging (MRI) is used to monitor the development of newborn's brain injuries post-hypothermia treatment as a prognostic tool. This project evaluated whether pontine injury occurs in term asphyxiated newborns by using MRI. Asphyxiated neonates treated with hypothermia were enrolled prospectively. Severity of brain injury in the cerebrum was scored on each MRI obtained during the first month of life. The apparent diffusion coefficient (ADC) and fractional anisotropy (FA) were measured in 2 regions of interest in the pons – the pyramidal tracts and the medial lemniscus. For each region of interest, ADC and FA values were compared statistically between the different groups of brain injury. ADC values for the pyramidal tract and medial lemniscus were significantly decreased on day 1 of life in the asphyxiated newborns treated with hypothermia compared to the healthy newborns. These results were not seen on the second and third day of life. In the medial lemniscus, ADC values were significantly increased and FA values were significantly decreased around day 30 of life in the brain injury group, compared to the no brain injury group. Measurement of ADC and FA values may demonstrate the extent and evolution of pontine injury in asphyxiated neonates treated with hypothermia.

Student Name: Amytice Mirchi

Abstract Title: Health-related quality of life (HRQOL) for genetically determined leukoencephalopathy patients and their families

Objectives: To characterize the health-related quality of life (HRQOL) in genetically determined leukoencephalopathy patients and their families as it relates to diagnostic status and severity of clinical features.

Methods: HRQOL was assessed using the Pediatric Quality of Life Inventory (PedsQL) model (Pediatric Quality of Life Inventory 4.0 self and proxy reports). A total of 36 patients diagnosed with genetically determined leukoencephalopathies, as well as their family members, completed the PedsQL HRQOL measures. Detailed clinical assessments were performed at the time the questionnaires were filled. HRQOL results were studied according to the severity of the clinical features and the presence vs. absence of a definitive molecular diagnosis.

Results: Preliminary results show lower total PedsQL scores among patients without a diagnosis, relative to patients with a diagnosis. Lower total scores were also observed for patients who presented more severe clinical features.

Conclusions: Patients without a definitive diagnosis have impaired HRQOL and those whose clinical features are more severe have lower HRQOL scores. Further analyses on a larger patient population in a prospective fashion are required to assess the burden of these diseases and identify potential modifiable factors.

Theme: MS and CNS Inflammatory Disease

Student Name: Atef Badji

Abstract Title: Association between cortical demyelination and structural network connectivity in early-stage multiple sclerosis

Purpose. Multiple sclerosis (MS) is a neurodegenerative disease of the central nervous system characterized by cortical and white matter demyelination. Cortical disruption and changes in brain connectomics in MS have been investigated; however, the relationship between both processes in early disease remains uncertain.

Methods. We propose an integrative framework that combines diffusion-based graph theory with high-resolution quantitative T1 and T2* at 7 Tesla to investigate the topological alterations of structural connectomics and cortical demyelination. 24 MS patients (age=39±8years, 22 females; mean disease duration 2.5±1years) and 18 healthy controls (age=38±11years, 10 females) were scanned on a 3T and 7T scanner.

Processing. Spatial Independent Component Analysis was used to extract the shared myelin related signal in T1 and T2* maps, thus creating the Combined Myelin Estimation (CME). Whole-brain tractography was obtained from Diffusion images using DSI-Studio. Connectivity matrices were computed across regions of interest. A bootstrap analysis was used to estimate the stability of the matrices using random data sub-samplings and found 10 highly stable clusters.

Results and discussion. We found cortical myelin loss using CME estimation, and yet an increase in connectivity using strength, local efficiency and clustering metrics ($p < 0.05$). Interestingly, the spatial distribution of the two processes are strongly anti-correlated ($\rho > 0.73$, $p < 0.05$). These findings suggest that the increase in brain connectivity in early MS stages might play an adaptive role against mild cortical demyelination.

Student Name: Marie-Ève Paquin

Abstract Title: Spinal Cord Gray Matter Atrophy in Amyotrophic Lateral Sclerosis

Objective: Quantify spinal gray matter atrophy in amyotrophic lateral sclerosis (ALS) and investigate its association with clinical disability at baseline and after one year.

Methods: 29 ALS patients (including 19 at one-year follow-up) and 22 healthy controls were scanned with a 3T MRI. Standard functional scale (ALSFRS-R) and manual muscle testing (MMT) were recorded at the time of MRI and after one year. MRI data were processed automatically to measure the spinal cord (SC), gray matter (GM) and white matter (WM) cross-sectional areas (CSA). A statistical analysis assessed (i) CSAs difference between ALS patients and controls, (ii) correlations between SC and GM atrophy and clinical disability at baseline and at one year, (iii) prediction of clinical disability at one year.

Results: GM atrophy was a more sensitive marker of ALS ($p = 0.004$) compared to whole SC atrophy ($p = 0.02$). GM and SC CSA showed strong correlations with clinical scores at baseline ($p = 0.004$ for GM and $p = 0.005$ for SC). Prediction at one year was highest with a model that includes clinical scores along with GM and WM CSA ($R^2 = 0.75$ vs. $R^2 = 0.54$ for clinical scores alone).

Conclusion: GM cord area can be measured non-invasively with MRI and is a sensitive marker of disease severity in ALS. While results warrant further investigations to disentangle the specific contribution of motoneuron degeneration in GM and global cord atrophy, this study suggests the potential use of MRI structural biomarkers to monitor the evolution of ALS.

Theme: Neurosurgery

Student Name: Benjamin Béland

Abstract Title: Pediatric vs Adult Meningioma: Comparison of Epidemiology, Treatments and Outcomes Using the SEER Database

BACKGROUND: Meningiomas, which account for 2% of pediatric CNS tumors, are suspected of behaving and being treated differently in children than in adults. However, no large-scale comparative study has addressed this.

METHODS: SEER STAT V8.2.1 identified all patients aged 0-107 years with meningiomas. We divided all patients into 3 age groups: Children/Adolescents (<21yrs), Young Adults (22-45yrs), Older Adults (>45 yrs). Demographic, initial treatment, and follow-up data were collected. Chi-square tests were performed to compare demographics between age groups. Relative risks for all-cause mortality were then estimated using log-binomial regression.

RESULTS: There were 381 (0.6%) children, 7464 (12.6%) young adults, and 51303 (86.7%) older adults diagnosed with meningiomas between 2004 and 2012. Median age at diagnosis in was 16, 40, 68 years, respectively. Death from any cause was much less common in children (4% vs 25%, $p < .0001$). Younger age, radiotherapy, and surgery were associated with better overall survival.

CONCLUSIONS: Pediatric meningiomas appear to be different than their adult counterparts in that they do not display the typical female predominance and they include more spinal tumors. However, they appear to be treated in a very similar fashion and have a similar low mortality, as meningiomas in young adult. This implies that while they may include more aggressive tumors, they are not necessarily more aggressive as a whole, than meningiomas in young adults. In this sense, the merits of aggressive surgery and radiation treatment in children and adolescents must be carefully considered on a case by case basis.

Theme: Neuro-oncology

Student Name: Matthew Dankner

Abstract Title: Orthotopic Patient Derived Xenografts as Relevant Models of Brain

Metastasis

Background Information: Brain metastasis occurs in 10-20% of cancer patients and results in median survival of less than 1 year. In order to begin accurately developing novel treatment strategies, there is an urgent need to establish valid models of brain metastasis. Therefore, we sought to establish orthotopic patient derived xenografts (PDX) of brain metastasis to be used in understanding the molecular mechanism employed by brain metastatic cells and to test novel therapeutic regimens.

Methods: Surgical specimens of brain metastasis were enzymatically dissociated and injected directly into the brains of NOD scid gamma (NSG) mice. At clinical endpoint, brains were dissociated for short-term tumorsphere culture. Tumorspheres were labeled with a Zs Green-Luc reporter construct, and re-injected into brains of new mice.

Results: 13 brain metastasis samples were implanted intracranial. 11/13 have successfully grown in the brains of mice as determined by hematoxylin and eosin (H&E) staining. All 11 that grew successfully in the first passage have been re-implanted in subsequent generations of mice, with 7 forming new tumors in these mice, and the remaining 4 not yet reaching the time point at which the first generation reached clinical endpoint. Analysis of H&E stained specimens reveals greater similarity between the patient sample and the orthotopic PDX compared to subcutaneously or mammary fat pad xenografts.

Conclusions: Orthotopic PDX models of brain metastasis are an improved model of brain metastasis that can be employed to test novel therapeutics and to develop our understanding of the molecular mechanisms engaged by brain metastases.

Theme: Neurology

Student Name: Jacob Abdaem

Abstract Title: Improving the quality of systematic reviews of neurological conditions with more accurate search strategies: a series of validation studies

Background: A well-constructed search strategy is an important feature of any systematic review. We aimed to design and validate electronic database (e.g. Pubmed) search strategies (i.e. a hedge or series of words used to identify articles of interest) for six neurological conditions.

Methods: We enumerated 10311 consecutive articles in the 21 highest impact factor English-language general neurology journals. We constructed a simple hedge, limited to one keyword, for each condition. We also constructed a complex hedge using a series of MeSH terms and keywords. Two reviewers independently reviewed (confirmed by a third reviewer) all articles and established which condition(s) were the article's subject. We calculated sensitivity/specificity estimates for the simple and complex hedges, and compared these using McNemar's test.

Results: The results are summarized in the Table.

Conclusions: Our complex hedges for most conditions dramatically improve sensitivity without compromising specificity. This study will help improve the accuracy of search strategies in future systematic reviews.

Neurological condition (total number of articles)	Sensitivity (95% CI)			Specificity (95% CI)		
	Simple hedge	Complex hedge	p-value	Simple hedge	Complex hedge	p-value
Migraine (n=321)	86.6 (82.4, 89.9)	88.5 (84.5, 91.5)	0.0313	99.9 (99.8, 100.0)	99.9 (99.8, 99.9)	0.1250
Stroke (n=1848)	70.9 (68.8, 73.0)	89.4 (87.9, 90.7)	< 0.0001	98.9 (98.6, 99.1)	97.0 (96.7, 97.4)	< 0.0001
Dementia (n=1401)	48.4 (45.8, 51.0)	83.4 (81.4, 85.3)	< 0.0001	99.2 (99.0, 99.1)	97.3, 96.9, 97.6)	< 0.0001
Epileptic seizures (n=1028)	63.8 (60.8, 66.7)	83.9 (81.6, 86.1)	< 0.0001	99.3 (99.1, 99.5)	99.2 (99.0, 99.4)	< 0.0001
Parkinson's disease (n=1002)	60.8 (57.7, 63.8)	92.3 (90.5, 93.8)	< 0.0001	99.7 (99.6, 99.8)	98.6 (98.4, 98.9)	< 0.0001
Multiple sclerosis (n=1000)	93.7 (92.2, 95.0)	95.2 (93.7, 96.4)	0.0001	99.7 (99.5, 99.8)	98.1 (97.8, 98.3)	< 0.0001

Theme: Sleep

Student Name: Ali Salimi

Abstract Title: The efficacy of cognitive behavioral therapy for insomnia in a structured program of benzodiazepine withdrawal on cognitive function and sleep in the elderly: a pilot study.

Background: Consumption of Benzodiazepines, sedatives prescribed for anxiety and insomnia, often becomes chronic and accompanies risks and comorbidities affecting a wide range of cognitive abilities. Cessation of benzodiazepine intake helps improving many of these domains, only partially. Cognitive behavioral therapy for insomnia (CBT-I) not only improves sleep quality measures, it improves success rates in weaning from benzodiazepines. For the first time, we are evaluating the effect of CBT-I on cognition upon withdrawal from prolonged benzodiazepine consumption for chronic insomnia.

Methods: 19 insomniacs above the age of 60, after undergoing a comprehensive sleep and cognitive evaluation, were randomly assigned into two groups of CBT-I (n=10) and wait-list (n=9). While both groups followed a progressive benzodiazepine withdrawal program over 16 weeks, the CBT-I group additionally received eight sessions of CBT-I therapy. At the end of the weaning program, both groups underwent the same sleep and cognitive evaluations.

Results and Conclusion: Our results highlight improvements in sleep measures. Both groups showed a significant decrease in the insomnia severity index ($p=0.000$) and Pittsburgh Sleep Quality Index ($p=0.003$) after weaning. Additionally, latency to sleep onset as measured by the sleep diary, decreased in the CBT-I group only ($p=0.004$). No improvement in cognitive performance was observed which could be explained by the limited sample size.

Significance: This study, by highlighting the benefits of non-drug options for treating insomnia, can support a funding policy favoring the emergence of clinical CBT-I in public health system and reduce the comorbidities and the costs associated with drug therapy in elderly.

Theme: Global Health

Student Name: Sheliza Halani

Abstract Title: Pregnancy Care for Women with Epilepsy in the Kingdom of Bhutan

The literature on the reproductive health of women with epilepsy (WWE) in low- and middle-income countries (LMIC) is limited. Many women in LMIC have unplanned pregnancies due to lack of pregnancy-related education and drug-drug interactions. We used a 10-question survey to interview WWE of childbearing potential in Bhutan to explore contraceptive use, pregnancy experiences, and epileptic histories. Among the 43 WWE, most women were within 30 to 39 years of age and 32 women (74%) had prior pregnancies. The average number of pregnancies was 2.8 per woman. Compared to other countries such as India where epilepsy is thought to have a deleterious effects on pregnancy, in Bhutan these perceptions may not be as exaggerated. Of the group with prior pregnancies, 69% used folic acid, 72% had information on family planning, 87% attended prenatal visits, and 23% had miscarriages. Seventy-five percent of the women without a completed education attended pre-natal visits while 95% of the group with some education attended visits. Most women began folic acid supplementation in the second trimester. From the women with prior pregnancies, 38% used depot medroxyprogesterone acetate (DMPA) or intrauterine devices (IUD), which are not likely to be influenced by enzyme-inducing AED's (EIAED's), while 9% used the progestin-only pill, which may be influenced by EIAED's. The most common AED's used while breastfeeding were phenytoin, which has a low degree of penetration into breast milk, followed by carbamazepine, which has moderate milk-to-plasma ratios. Further studies would include investigating differences among urban and rural parts of Bhutan.

Theme: Other

Student Name: Mohammed E El Yamani

Abstract Title: Distribution laminaire des projections corticales vers le complexe thalamique latéral postérieur-pulvinar chez le chat

Introduction : Les connexions entre les aires du cortex cérébral définissent une organisation hiérarchique, avec les aires sensorielles primaires à la base et les aires associatives au sommet de cette structure. Les aires corticales communiquent aussi entre elles par des voies cortico-thalamo-corticales indirectes. Les projections cortico-thalamiques proviennent de deux sources. Les projections issues des neurones de la couche 5 sont dites feedforward et celles issues de la couche 6, feedback. Dans cette étude nous mettons à l'épreuve l'hypothèse que les connexions cortico-thalamo-corticales sont organisées selon la même structure hiérarchique que les connexions cortico-corticales directes.

Matériel et méthodes : Des injections du fragment B de la toxine du choléra (CTB) par iontophorèse ont été effectuées dans LP chez des chats adultes et les neurones marqués rétrogradement dans les couches 5 et 6 ont été cartographiés (NeuroLucida MBF Bioscience).

Résultats : Les projections cortico-thalamiques vers LP proviennent principalement des aires 7, 17, 18, 19, 20a, 20b, 21a, et des aires latérales et médiales des sillons suprasylvien et ectosylvien. Dans l'aire 17, les neurones marqués étaient surtout localisés dans la couche 5 ; tandis que dans les aires de plus haut niveau, ils étaient majoritairement localisés dans la couche 6. Le rapport laminaire entre la couche 5 et 6 n'est d'ailleurs pas homogène à travers les aires d'ordre supérieur.

Conclusions : Les connexions des aires visuelles extrastriées du chat vers le LP sont donc constituées de proportions différentes de projections de type 1 et 2 ; les deux hiérarchies sont distinctes.

Student Name: Ke Xuan Li

Abstract Title: Variation of Vessel Density and Deposited Iron Across Cortical Laminae in Rat Area S1FL

Functional Magnetic Resonance Imaging (fMRI) is a non-invasive technique that allows one to image brain activity. Importantly, a difference in activity can be observed in the different layers of the cortex during activity imaging. The research project allows us to determine whether small blood vessel density varies in the cortical laminae of the S1FL region of the rat cortex by quantifying said density. This will make it possible to determine whether the different fMRI responses in the different layers are the result of differences in neuronal activity or simply a reflection of the varying density of vessels. The presence of iron in the same region is also identified. To accomplish this, the rat brains are sliced and processed with several histological techniques. The scanned images of the slides containing the brain sections stained for cell bodies and metabolism are used to identify all six cortical layers and matched to slices stained for blood vessels and iron. Within S1FL, layer IV was found to have the densest small vessel network, followed by layers II/III, V, I and VI. Minimal iron staining areas were found in the rat S1FL.

The project confirms variation of vessel density in the region and allows for the potential calibration of the fMRI scanning technique in subsequent studies while taking the former into account. The present work will ultimately allow us to better identify neurological diseases by means of resting-state functional MRI, which will be calibrated according to variation of vessel density.

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