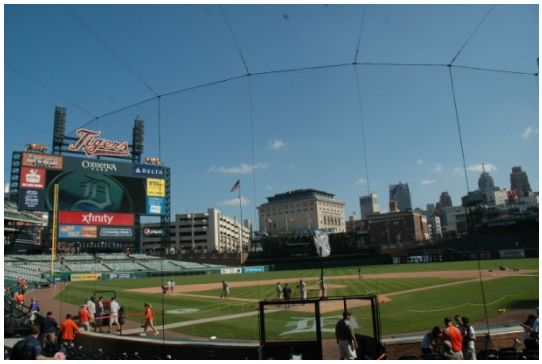
Schulich MEDICINE & DENTISTRY

Western

2018 CNS DEPARTMENTAL RESEARCH DAY

Ivey Spencer Conference Centre
London, Ontario

Tuesday April 17, 2018



Welcome,

We welcome you to the 2018 CNS Departmental Research Day. Based on the continuing feedback we received over the last four years we have made a few changes and kept a few things the same.

The event is again being held at the Ivey Spencer Conference Centre and again we have a room that will be entirely dedicated to the poster presentations. Each poster presenter will have adequate space for their individual poster and there should be room for attendees and judges to have discussions with the poster presenters.

Based on feedback, we have extended the morning and afternoon break periods to 60 minutes each and kept the lunch period at 60 minutes. This will allow attendees and the judges even more time to interact with the poster presenters. Just as in previous years, there will be assigned times during the morning and afternoon break periods when poster presenters will be required to stand by their posters. Please use those times to discuss posters with the presenters. Like last year please use the breakfast and lunch periods to view posters and interact with your colleagues. This year there will be 20 oral presentations and 29 poster presentations (total of 49 submissions). As in the past many people indicated that they preferred a poster presentation and we have honored those requests.

Our keynote speaker / guest judge this year is Dr. Tom Mikkelsen who is a neurologist and President and Scientific Director of the Ontario Brain Institute in Toronto, Ontario. In the past he worked at the Henry Ford Hospital and Hermelin Brain Tumor Center in Detroit, Michigan, USA. There he made important contributions involving CNS tumour clinical trials and the molecular biology of glioblastoma. His biographical sketch is on the following page.

Once again we will be awarding prizes for the “best” abstract presentations. Though this has been a traditional part of the event it should not be construed as being the main goal of the event. The intent of the CNS Departmental Research Day is to make all members of the CNS family aware of what their colleagues are doing – both in clinical and basic science research. We look forward to both the formal and informal exchange of this research information throughout the day.

Finally, we would like to thank Kelsey Stanczyk and Lisa BakerSpiller for their hard work in helping to put this event together! We all hope that you will have an enjoyable day!

Joe Megyesi
David Macdonald
Department of Clinical Neurological Sciences

Learning Objective

Attendees will learn about advances in both clinical and basic research that pertain to various topics in the clinical neurological sciences, both neurology and neurosurgery.

Dr. Tom Mikkelsen
MD, FRCPC
Invited Guest Speaker/Judge

Dr. Tom Mikkelsen, MD, FRCPC is a neurologist and the President and Scientific Director of the Ontario Brain Institute (2015-present). He received his MD from the University of Calgary and completed clinical training in neurology at the Montreal Neurological Institute. Following this, he did post-doctoral training in tumour and molecular biology at the Ludwig Institute for Cancer Research in Montreal and then in La Jolla, California. Since 1992, he has led the brain tumour program at Henry Ford Hospital and was responsible for building the clinical trial program and laboratory of tumour biology. Together with other scientists, he helped assemble the Hermelin Brain Tumor Center, a leader in the understanding of the genetics of brain tumours and in the development of treatments for brain tumours. As Co-Director, he participated in the organization's development on many levels spanning from face-to-face clinical care to clinical trials and translational and bench research.

Dr. Mikkelsen's presentation, titled *The Ontario Brain Institute – Team Science for Research with Impact*, will focus on the OBIs activities in its next phase, highlighting the opportunities for innovating within the healthcare delivery sector for neurologic disorders.

Major themes will include the learning healthcare system, data sharing and partnering with academic, corporate and government players. Shared strategies from the CNS cancer experience will also be included.

Department of Clinical Neurological Sciences

presents

CNS DEPARTMENTAL RESEARCH DAY

Ivey Spencer Conference Centre

Tuesday, April 17, 2018

0730-0800 **Breakfast**

0800-0805 **Welcome**

Dr. Paul Cooper
Chair/Chief, Department of Clinical Neurological Sciences
Western University

0805-0815 **Introduction**

Dr. David Macdonald and Dr. Joseph Megyesi

Oral Presentations

Morning Session: Moderator: Dr. Joseph Megyesi

0815-0830 **(PLAT -1) An assessment on the efficacy of VNS in generalized epilepsy.**

Suller-Marti A, Parrent A, McLachlan RS, Mirsattari S, Diosy D, Steven DA, MacDougall K, Burneo JG

0830-0845 **(PLAT-2) Evolution of intracranial electroencephalographic monitoring in the presurgical investigation of drug-refractory epilepsy.**

Joswig H, Lau JC, Abdallat M, Benson CM, Parrent AG, MacDougall KW, Burneo J, Steven DA

0845-0900 **(PLAT-3) Identification of electrode locations within hippocampal substructures using 7-Tesla magnetic resonance imaging.**

Lau JC, DeKraker J, MacDougall K, Joswig H, Parrent AG, Burneo J, Steven DA, Peters TM, Khan AR

0900-0915 **(PLAT-4) 7T magnetic resonance spectroscopy of the hippocampus of MRI normal temporal lobe epilepsy patients.**

Adams J, Nikolova S, Brown S, Bartha R, Burneo JG

0915-0930 **(PLAT-5) Investigating quantitative and structural differences in short association, U-shaped fibres in temporal lobe epilepsy.**

Kai J, Kasa LW, Peters TM, Khan AR

0930-1030 **Break**

Poster Session #1 – Poster Viewing – Author Standby: Odd Number

Posters: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29

1030-1045 **(PLAT-6) Developing novel electrotherapeutic interventions for glioblastoma and pediatric diffuse intrinsic pontine glioma.**

Deweyert AM, Di Sebastiano AR, Xu H, Benoit SM, Ronald JA, Scholl T, Schmid S, Hebb MO

1045-1100 **(PLAT-7) Growth dynamics of low-grade gliomas on serial imaging.**

Gui C, Lau JC, Kosteniuk SE, Megyesi JF

1100-1115 **(PLAT-8) The risk of malignancy after stereotactic radiosurgery.**

Wolf A, Naylor K, Novotny J, Liscak R, Martinez-Moreno N, Martinez-Alvarez R, Sisterson N, Kano H, Sheehan J, Lunsford LD, Silverman J, Kondziolka D

1115-1130 **(PLAT-9) A framework for reproducible evaluation of geometric inhomogeneity in magnetic resonance images.**

Park PJ, Peters TM, Khan AR, Lau JC

1130-1145 **(PLAT-10) A comparison of skull stripping methods for 7T MRI scans.**

Zhou Y, Lau JC, Khan AR, Xiao Y

1145-1200 **(PLAT-11) Effect of prior percutaneous synovial cyst rupture on operative management.**

McGregor S, Kwan B, Salehi F, Jia S, Pelz D, Sharma M, Duggal N

1200-1300 ***Lunch – Poster Viewing – Author Standby Optional.***

Oral Presentations

Afternoon Session: Moderator: Dr. David Macdonald

1300-1315 **(PLAT-12) Neuronal secretory lysosomes mediate calcium-dependent exocytosis of beta-amyloid.**

Lahan S, Seah C, Tam J, Pasternak SH

1315-1330 **(PLAT-13) Relating hippocampal glutamate to structural changes and cognitive performance in Alzheimer's disease: A 7T MRI study.**

Wong D, Atiya S, Fogarty J, Montero-Odasso M, Pasternak S, Bymer C, Borrie, M, Bartha R

1330-1345 **(PLAT-14) Identifying biomarkers associated with the development of hallucinations and delusions in Alzheimer's disease: A multimodal neuroimaging and genetic analysis study.**

Ahmed J, Patel S, Palaniyappan L, Pasternak S, Masellis M, Finger E

1345-1400 **(PLAT-15) Visual velocity, temporal, and displacement perception in Parkinson's disease analyzed using a computer generated graphic tool.**

Bernardinis M, Atashzar SF, Jog M, Patel RV

1400-1415 **(PLAT-16) Role of baseline dorsal and ventral striatum activity in stimulus-response learning in patients with obsessive compulsive disorder.**

Hiebert NM, Lawrence M, Owen AM, Watling M, Seergobin KN, MacDonald PA

1415-1430 **(PLAT-17) Assessing cognitive function and brain health in older adults at-risk for diabetes.**

Furlano J, Nagamatsu L

1430-1530 **Break**

Poster Session #2 - Poster Viewing – Author Standby: Even Number

Posters: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28

1530-1545 **(PLAT-18) Next-generation sequencing to investigate transcriptomic changes in cortical samples from living Parkinson's patients.**

Benoit SM, Xu H, Alexandrova R, Kaur G, Thiruvahindrapuram B, Hebb MO

1545-1600 **(PLAT-19) Clarifying dopaminergic projections of the ventral tegmental area and substantia nigra in humans using structural magnetic resonance imaging.**

Handfield-Jones N, Erind Alushaj, Nole H Hiebert, Adrian M Owen, Ali R Khan*, Penny A MacDonald*

1600-1615 **(PLAT-20) Long-term outcomes in the management of central neuropathic pain syndromes: A prospective observational cohort study.**

Staudt MD, Clark AJ, Gordon AS, Lynch ME, Morley-Forster PK, Nathan H, Smyth C, Stitt LW, Toth C, Ware MA, Moulin DE

1615-1700 **Keynote Address:**

The Ontario Brain Institute – Team Science for Research with Impact

Objectives:
1. Gain a better understanding of the role of The Ontario Brain Institute in supporting neuroscience research.
2. Gain a better understanding of how team science can lead to more impactful neuroscience research.

Dr. Tom Mikkelsen

President and Scientific Director
The Ontario Brain Institute
Toronto, Ontario

Past Co-Director
Hermelin Brain Tumor Center
Detroit, Michigan, USA

Introduction: Dr. Joseph Megyesi

1700-1715 **Conclusion and Awarding of Prizes**

Dr. David Macdonald and Dr. Joseph Megyesi

Posters

Poster 1 **(POST-1) Can meditation strategies improve attention in older adults with a history of falls?**

Ford S, Nagamatsu L

Poster 2 **(POST-2) Brain magnetic resonance imaging (MRI) susceptibility artifacts post cardiac surgery in children.**

Alanezi A, Campbell C, Tay K, Welisch E, Andrade A

Poster 3 **(POST-3) Prevalence of autoimmune disorders in frontotemporal dementia and related disorders.**

Thiyagarajah M, Finger E

Poster 4 **(POST-4) Assessing cardiac dysfunction post-stroke in the insular cortex ischemic stroke rat model.**

Jaremek V, Balint B, Torburn V, Paquet M, Melling J, Sposato LA, Whitehead SN

Poster 5 **(POST-5) Investigating anatomical regions in which myelin abnormalities occur in schizophrenia using high resolution quantitative R1 maps.**

Rejali H, Gowland P, Liddle P, Radaideh A, Palaniyappan L, Khan AR

Poster 6 **(POST-6) Development of an insular ischemic stroke animal model to study the pathophysiology of atrial fibrillation detected after stroke (AFDAS).**

Thorburn V, Balint B, Paquet M, Whitehead SN, Sposato LA

Poster 7 **(POST-7) Ventricular volume in frontotemporal dementia and genetically at-risk family members: results from the GENFI study.**

Tavares TP, Mitchell D, Coleman K, Shoesmith C, Bartha R, Cash DM, van Swieten J, Borroni B, Galimberti D, Tartaglia MC, Rowe J, Graff C, Tagliavini F, Frisoni G, Cappa S, Laforce Jr R, Mendona A, Sorbi S, Rossor MN, Masellis M, Rohrer JD, Finger E on behalf of the Genetic FTD Initiative, GENFI

Poster 8 **(POST-8) Diagnostic and prognostic trends in stroke patients with carotid free floating thrombus: A systemic literature review.**

Fridman S, Lownie SP, Mandzia J

Poster 9 **(POST-9) The psychophysiology of guilt.**

Stewart CA, Mitchell DGV, MacDonald PA, Neufeld RWJ, Finger EC

Poster 10 **(POST-10) Pseudoglandular schwannoma causing cauda equine syndrome: a case report.**

Kosteniuk S, Ganesh A, Kashani N, Wiebe N

Poster 11 **(POST-11) Preclinical evaluation of progenitor cells from the living parkinsonian brain: potential for cell-based therapy.**

Benoit SM, Xu H, Nystrom N, Parkins K, Hamilton A, Ronald J, Scholl T, Foster P, Schmid S, Hebb MO

Poster 12 **(POST-12) Perception of low-grade glioma growth on serial imaging.**

Gui C, Lau JC, Megyesi JF

Poster 13 **(POST-13) Effects of BoNT-A injections in the subthalamic nucleus of a hemi-Parkinsonian rat model.**

Khazov O, Jog M, Rajakumar N

Poster 14 **(POST-14) Comparing the efficacy of image-guidance methods for ventricular catheterization: A meta-analysis of Ommaya reservoir procedures.**

Lau JC, Kosteniuk SE, Walker T, Iansavichene A, Macdonald DR, Megyesi JF

Poster 15 **(POST-15) Differentiating the ventral tegmental area and substantia nigra in Parkinson's disease using magnetic resonance imaging.**

Alushaj E

Poster 16 **(POST-16) Felling green: case report of pediatric cerebellar myeloid sarcoma and review of literature.**

Ghare A, Langdon K, Andrade A, Kiwan R, Hammond R, Ranger A

Poster 17 **(POST-17) Investigating the utility of current steering for treating Parkinsonian gait.**

Hui D, Jog M

Poster 18 **(POST-18) Correlation of objective and subjective measures in the treatment of cervical spondylotic myelopathy.**

McGregor S, Goncalves S, Detombe S, Bartha R, Duggal N

Poster 19 **(POST-19) L-Dopa alters the process of auditory regularity detection.**

Al Jaja A, Herrmann B, Grahn J, MacDonald PA

Poster 20 **(POST-20) Long-term experience with occipital and supraorbital nerve stimulation for the various headache disorders – an institutional case series.**

Joswig H, Abdallat M, Karapetyan V, MacDougall KW, Cooper PE, Parrent AG

Poster 21 **(POST-21) Evaluating the positive predictive value of onconeural antibody testing in patients with suspected paraneoplastic neurologic syndromes.**

Budhram A, Nicolle MW, Yang L

Poster 22 **(POST-22) Histology to ultra-high field MRI registration of a human cadaveric subcortex: workflow model.**

Demarco JP, Lau JC, Khan AR

Poster 23 **(POST-23) Predictors of vocational status among persons with multiple sclerosis.**

Bhatty D, Blair M, Mehta S, Gill S, Morrow SA

Poster 24 **(POST-24) High rate spinal nerve root stimulation for the treatment of chronic neuropathic pain.**

Staudt MD, MacDougall KW

Poster 25 **(POST-25) Unfolded hippocampal coordinate system in 3D histology.**

DeKraker J, Ferko K, Lau JC, Kohler S, Khan A

Poster 26 **(POST-26) Development of brain biopsy simulator for surgical trainees.**

Naeem A-H, Abuaysha M, Namavarian A, Denning L, Lownie S

Poster 27 **(POST-27) Activated B cells participating in the anti-myelin response are excluded from the inflamed central nervous system in a model of autoimmunity that allows for B cell recognition of autoantigen.**

Tesfagiorgis Y, Zhu S, Jain RW, Kerfoot SM

Poster 28 **(POST-28) Two distinct clinical phenotypes in a family with ALSP caused by a novel CSF1R mutation.**

Taylor RG, AlYamany B, Pandey S, Kertesz A, Ang LC, Finger E

Poster 29 **(POST-29) Familial idiopathic normal pressure hydrocephalus in a Canadian family.**

Shettar BC, Mirsattari SM

Organizers: Dr. Joseph F. Megyesi, Dr. David R. Macdonald, Kelsey Stanczyk, Lisa Baker-Spiller

Judges: Dr. Tom Mikkelsen, Dr. Adrianna Ranger, Dr. Rudy Noppens

Past Keynote Speakers / Guest Judges

2014 Dr. Rolando Del Maestro
Neurosurgery
McGill University
Montreal, Quebec
Simulation and Neurosurgical Expertise: Integrating Theory into Practice

2015 Dr. G. Bryan Young
Neurology
University of Western Ontario (emeritus) and Grey Bruce Health Services
Owen Sound, Ontario
Dammit, Jim, I'm Just a Community Neurologist

2016 Dr. M. Christopher Wallace
Neurosurgery
Queen's University
Kingston, Ontario
Research in Medical School, Residency and Practice: Worth It?

2017 Dr. Cynthia Hawkins
Neuropathology
University of Toronto
Toronto, Ontario
The Genetics and Epigenetics of Paediatric Astrocytoma

Platform 1

Abstract Title:

An assessment on the efficacy of VNS in Generalized Epilepsy

Author(s):

A Suller-Marti, A Parrent, RS McLachlan, S Mirsattari, D Diosy, DA Steven, K MacDougall, JG Burneo

Abstract:

Rationale: The VNS (Vagus Nerve Stimulation) is a type of neuromodulation therapy used in patients with focal epilepsy, usually reserved for those who are not candidates for resective surgery. There is not clear evidence if it has the same effect in all types of epilepsy. Our aim is to assess how effective this treatment is in those with generalized tonic-clonic (GTC) seizures in the context of generalized epilepsy. Methods and patients: We interrogated the database of the Epilepsy program at Western University and identified those patients with generalized epilepsy, who underwent VNS implantation, since t1998 until March 2018. Results: 16 patients underwent VNS implantation in our center with history of generalized epilepsy. The mean age of implantation was 27.9 years (range: 18-51), 10 patients (62.5%) were male. The frequency of GTC seizures range from daily to several per year. After the implantation, none of the patients was GTC seizure free, 5 (31.3%) had a more than 50% reduction in the frequency of seizures. Conclusion: VNS appears to be a therapy effective for focal epilepsy and reducing the number of GTC seizures in seizures in those with generalized epilepsy.

Platform 2

Abstract Title:

Evolution of Intracranial Electroencephalographic Monitoring in the Presurgical Investigation of Drug-refractory Epilepsy.

Author(s):

Holger Joswig, Jonathan C. Lau, Mahmoud Abdallat, Carolyn M. Benson, Andrew G. Parrent, Keith W. MacDougall, Jorge Burneo, David A. Steven

Abstract:

Background: At the London Health Sciences Centre Epilepsy Program, the practice has shifted from using subdural electrodes (SE) to Leksell frame-based conventionally, or recently robot-assisted stereoelectroencephalography (SEEG) for intracranial electroencephalographic monitoring in the investigation of drug-refractory epilepsy.

Materials and Methods: Pro- and retrospective databank analysis to compare n=335 SE and n=130 SEEG cases.

Results: Implantation of one SEEG depth electrode (DE) took 14.5±7.7 min (19.7±9.8 min for one SE; $p<0.01$) and exposed the patient for 4.5±7.5 sec to 16.8±31.4 rad*cm2 per DE (7.8±8.2 sec; 22.1±23.1 rad*cm2 for one SE, repectively; $p<0.01$). Complications were low in both groups (5.4%; 4.8%) with no infections seen after SEEG (1.8% after SE). There was no difference in length of stay (11.9±6; 12.2±7.5 days). Use of the stereotactic robot further improved operative time (8.8±2.6 min per DE) and target accuracy (2.1±0.8 mm; n=3).

Conclusions: For their good safety profile, better feasibility and high patient acceptance, we prefer robot-assisted stereotactically implanted DE over the Leksell frame-based conventional technique and over SE.

Platform 3

Abstract Title:

Identification of Electrode Locations Within Hippocampal Substructures Using 7-Tesla Magnetic Resonance Imaging

Author(s):

Jonathan C Lau, Jordan DeKraker, Keith MacDougall, Holger Joswig, Andrew G. Parrent, Jorge Burneo, David A. Steven, Terry M Peters, Ali R. Khan

Abstract:

Background: The hippocampus is commonly implicated in drug-resistant epilepsy and anatomically can be divided into the head, body, and tail; and unfolded into specific subfields: the subiculum, cornu ammonis (CA) sectors, and dentate gyrus (DG). We propose to use 7-Tesla (7T) magnetic resonance imaging (MRI) to identify electrode locations within hippocampal substructures.

Methods: 53 patients were identified undergoing intracerebral electrode implantation. Electrode contacts were labeled from computed tomography images and transformed into our recently developed 7T coordinate space for substructure labeling.

Results: Out of a total of 178 implanted hippocampal electrodes (88 left; 49.4%), 25 (14.0%) were predominantly in the subiculum, 85 (47.8%) were in CA1, 23 (12.9%) were in CA2, 18 (10.1%) were in CA3/CA4, and 27 (15.2%) were in DG. Electrodes were most commonly implanted in the body (92; 51.7%) followed by the head (86; 48.3%).

Conclusions: Here, we demonstrate the use of 7T MRI to assist with identifying electrode locations within hippocampal substructures suggesting the feasibility of targeting specific substructures.

Platform 4

Abstract Title:

7T Magnetic Resonance Spectroscopy of the Hippocampus of MRI Normal Temporal Lobe Epilepsy Patients

Author(s):

John Adams, Simona Nikolova, Suzan Brown, Robert Bartha, and Jorge G Burneo

Abstract:

Introduction: Multi-modal identification of epileptic tissue is essential to ensure good outcomes for patients undergoing surgical treatment. A sizable fraction of epileptic patients do not have any structural defects associated with epileptic foci, limiting the utility of MRI in assisting surgical planning. To bridge this gap, we are studying whether magnetic resonance spectroscopy (MRS) can identify epileptic tissue in the most common form of focal epilepsy, temporal lobe epilepsy (TLE).

Methods: Eight unilateral TLE patients with normal clinical MRI scans were recruited though the Epilepsy Program at London Health Sciences Centre. Eleven age, and sex matched healthy participants were recruited to serve as a control group. MRS data were collected from each hippocampus separately using a 7T MRI system.

Results: Data were divided into 3 groups; data from controls, data from epileptic hippocampi in patients, and data from non-epileptic hippocampi in patients. None of the metabolites studied showed significant changes. Asymmetry indices were used to lateralize metabolite changes within patients; lateralization of metabolite levels did not correspond with seizure lateralization.

Platform 5

Abstract Title:

Investigating quantitative and structural differences in short association, U-shaped fibres in temporal lobe epilepsy

Author(s):

Jason Kai, Loxlan W. Kasa, Terry M. Peters, Ali R. Khan

Abstract:

Introduction: Changes to the brain due to disease has been studied in depth. Despite this, little is known about short association, U-shaped fibres, which create a local circuit and has been shown to exhibit changes in epilepsy, a neurological condition associated with multiple seizures. Diffusion MRI (dMRI) is one technique capable of modelling white matter fibres to explore these pathways.

Hypothesis: We hypothesize local pathways will exhibit quantitative characteristics differentiating patients with epilepsy from healthy individuals.

Methods: We acquired dMRI data for controls and patients with temporal lobe epilepsy. Whole-brain fibres was modelled using MRTrix and an algorithm was implemented to identify local circuitry. Quantitative and geometric metrics were computed and compared using two-tailed t-tests, corrected for false discovery rates.

Results: Candidate U-shaped fibres were identified using the implemented algorithm. Metrics compared did not find differences between control and patients with epilepsy.

Conclusion: Future work include investigating other epilepsy classifications and network connectivity.. The tool can also be applied to other patient populations.

Platform 6

Abstract Title:

Developing novel electrotherapeutic interventions for glioblastoma and pediatric diffuse intrinsic pontine glioma

Author(s):

Andrew M. Deweyert, Andrea R. Di Sebastiano, Hu Xu, Simon M. Benoit, John A. Ronald, Tim Scholl, Susanne Schmid, Matthew O. Hebb

Abstract:

Intratumoral modulation therapy (IMT) is a putative new treatment modality that delivers non-ablative electrical stimulation into tumor-affected brain regions. Our group has previously shown that IMT reduces glioblastoma burden and now aims to access the therapeutic potential of IMT for diffuse intrinsic pontine glioma (DIPG). We hypothesize that IMT combined with temozolomide (TMZ), will increase drug sensitivity and reduce DIPG cell viability. DIPG cells were treated with 72-hour IMT (200 kHz, 4V, sine wave), TMZ, or IMT and TMZ combined. Cell viability was assessed with activated caspase-3, MTT assay, and flow cytometry. The MTT assay revealed a significant loss of metabolic viability in DIPG cells treated with IMT in vitro (>40% vs. sham; n=5, $p<0.01$). TMZ therapy resulted in a 28% reduction in cell viability while IMT and TMZ combined generated a highly significant 70% reduction. All primary DIPG cells tested were sensitive to IMT monotherapy and showed sensitization to TMZ chemotherapy when combined with IMT. This study demonstrates the potential of IMT as a novel electrotherapeutic strategy for the treatment of DIPG and supports the development of in vivo preclinical models.

Platform 7

Abstract Title:

Growth dynamics of low-grade gliomas on serial imaging

Author(s):

Chloe Gui, Jonathan C. Lau, Suzanne E. Kosteniuk, Joseph F. Megyesi

Abstract:

Background

Low-grade gliomas (LGGs) are infiltrative, slow-growing brain tumors that remain relatively asymptomatic for long periods of time before progressing to aggressive high-grade gliomas.

Methods

We retrospectively identified LGG patients that were stably managed by observation with numerous (n≥8) serial magnetic resonance imaging (MRI) studies. Tumour volumes were measured by manual segmentation on imaging to study tumour growth. Patient and tumour data were collected from medical records.

Results

Of 74 LGG patients, 10 patients met the inclusion criteria. Tumor diameter linearly increased at a median rate of 2.17 mm/year. Cox regression analysis revealed that initial tumour volume predicted time to clinical intervention, and Mann-Whitney U test found that patients diagnosed before age 50 had significantly slower-growing tumors. Clinical intervention was more likely for tumours larger than 73.6 mL.

Conclusion

We retrospectively analyzed the natural history of LGGs in patients with numerous MRIs. Growth and molecular analyses reveal that this is a subset of slow-growing and low-risk LGGs that are predominantly of the IDH-mutated, 1p19q codeleted oligodendroglioma subtype.

Platform 8

Abstract Title:

The Risk of Malignancy after Stereotactic Radiosurgery

Author(s):

Amparo Wolf, Kyla Naylor, J. Novotny, R. Liscak, N. Martinez-Moreno, R. Martinez-Alvarez, N. Sisterson, Hide Kano, Jason Sheehan, L. Dade Lunsford, Josh Silverman, Douglas Kondziolka

Abstract:

Background: A major concern of patients undergoing stereotactic radiosurgery (SRS) for benign tumors is the risk of a separate secondary malignancy or malignant transformation. The incidence of radiosurgery-associated malignancy based on long-term follow-up remains unknown.

Methods: We conducted a population-based cohort study to estimate the incidence rate of both malignant transformation and a separate radiation-associated malignancy in patients undergoing SRS at 5 major centers from 1987 to 2016.

Results: Of 14,168 patients who underwent SRS, 8970 patients had follow-up of at least 2 years for conditions including vestibular schwannoma, meningioma, arteriovenous malformation, among others. The median follow-up time was 5.1 years (2-23.8 years). Three cases of malignant transformation and 3 new malignant brain tumors were reported for an incidence of 8.1 per 100 000 patient-years and 5.2 per 100 000 patient-years respectively. The incidence of developing a radiosurgery-associated malignancy is 0.001% over 10 years.

Conclusion: Physicians can safely counsel patients that the risk of malignancy after SRS remains extremely low even at long-term follow-up of greater than 10 years.

Platform 9

Abstract Title:

A Framework for Reproducible Evaluation of Geometric Inhomogeneity in Magnetic Resonance Images

Author(s):

Patrick J. Park, Terry M. Peters, Ali R. Khan, Jonathan C. Lau

Abstract:

Geometric inhomogeneity in magnetic resonance images (MRI) results from scanner and patient-specific factors that affect the anatomical accuracy of image acquisitions. These inherent spatial uncertainties should be accounted for in neuroimaging studies and clinical applications like stereotactic neurosurgery. We recently described a workflow for characterizing geometric distortion in ultra-high field (>= 7 Tesla (T)) MRI, permitting the identification of regions of both increased susceptibility and gradient distortion. However, these findings were scanner and acquisition dependent and thus not generalizable to other sites or scanners. There remains a lack of standardization regarding the processing steps necessary to produce geometrically optimal MR images. One solution is to use standard physical phantoms; however, these fail to account for subject-specific factors. Here, we have implemented our framework using an open, extensible format2 to facilitate morphometric evaluations between images. To illustrate the utility of this workflow, we quantify the impact of vendor-provided gradient distortion correction on a prospective series of 7T images.

Platform 10

Abstract Title:

A Comparison of Skull Stripping Methods For 7T MRI Scans

Author(s):

Yaojie Zhou, Jonathan C. Lau, Ali R. Khan, and Yiming Xiao

Abstract:

Skull stripping is crucial in neuroimage analysis, but most algorithms were designed for 1.5 and 3T MRI. To assess them for 7T MRI, brain masks were manually segmented on 7T T1w MRIs of 10 healthy subjects. We compared 3 popular methods (BEaST, BET & ROBEX) against manual segmentations. As BEaST relies on the similarity between its brain mask library and images to be processed, we tested 3 different such libraries (the default library, newly augmented library & the addition of our 7T library of 9 subjects to the new library). Dice coefficients were computed between the automatic and manual segmentation. Results are 0.949±0.004 and 0.935±0.041 for BET and ROBEX, and 0.939±0.014, 0.978±0.002, and 0.979±0.002 for BEaST with default, augmented, and additional 7T libraries. One-way ANOVA tests showed that BEaST with augmented libraries and additional 7T libraries outperformed the rest ($p<0.05$) with no statistical difference between them. However, the mean Dice coefficient is higher for BEaST with 7T library. In summary, BEaST is a suitable choice for 7T MRI skull stripping. The addition of 7T BEaST library offers greater accuracy, and can be further improved with a bigger library.

Platform 11

Abstract Title:

Effect of Prior Percutaneous Synovial Cyst Rupture on Operative Management

Author(s):

McGregor, Stuart; Kwan, Benjamin; Salehi, Fateme; Jia, Sang; Pelz, David; Sharma, Manas; and Neil Duggal.

Abstract:

Background: Synovial cysts are an uncommon cause of lumbar spinal stenosis. There is ongoing debate about the best treatment option. The percutaneous rupture of synovial cysts is a common therapy, but does carry an increased risk of recurrence. The purpose of this retrospective study was to determine if prior percutaneous cyst rupture leads to increased difficulty or morbidity at the time of open cyst resection.

Methods: A total of twenty-two patients, 11 of whom had prior percutaneous rupture, were reviewed retrospectively and compared in two groups (prior rupture vs. naive) for operative length, cerebrospinal fluid leak, scarring and adhesions, cyst remnant, post-operative infections or wound issues, symptom control, new neurological symptoms and cyst recurrence.

Results: No significant differences were seen across all peri-operative variables between patients who had undergone prior percutaneous synovial cyst rupture and those who had not.

Conclusion: Prior percutaneous cyst rupture does not confer an increase risk at the time of open resection of lumbar synovial cysts. We are currently continuing to collect data for a prospective study.

Platform 12

Abstract Title:

Neuronal Secretory Lysosomes Mediate Calcium-Dependent Exocytosis of Beta-Amyloid

Author(s):

Shany Lahan, Claudia Seah, Joshua Tam, Stephen H. Pasternak

Abstract:

Alzheimer’s disease (AD) is the leading form of dementia (Chatterjee et al., 1992). It has previously been suggested that the extracellular deposition of beta-Amyloid (Aβ) is a critical early event that leads to progression of AD (Hardy & Higgins, 1992). However, the intracellular compartment responsible for Aβ secretion is unknown. Prior to extracellular deposition, Aβ has been shown to collect within lysosomes (Meadowcroft et al., 2009). Furthermore, extracellular Aβ plaques have revealed the presence of many lysosomal enzymes (Cataldo & Nixon, 1990). In this study, it is hypothesized that lysosomes mediate calcium-dependent exocytosis of Aβ. To observe this, lysosomes of live differentiated neurons were fluorescently labeled and subsequently loaded with fluorescent Aβ. The cells were then stimulated to undergo calcium-dependent exocytosis, and were visualized using Total Internal Reflection Fluorescence Microscopy (TIR-FM). Preliminary results demonstrate that lysosomes undergo calcium-dependent exocytosis in differentiated neurons. Elucidating the compartment responsible for Aβ secretion may facilitate the development of targeted treatments for AD.

Platform 13

Abstract Title:

Relating Hippocampal Glutamate to Structural Changes and Cognitive Performance in Alzheimer’s Disease: A 7T MRI Study

Author(s):

Dickson Wong, Samir Atiya, Jennifer Fogarty, Manuel Montero-Odasso, Stephen Pasternak, Chris Brymer, Michael Borrie, Robert Bartha

Abstract:

We previously observed decreased hippocampal glutamate (Glu) levels in Alzheimer's disease (AD) using proton magnetic resonance spectroscopy (MRS) at 4T. We extend that work by measuring hippocampal and posterior cingulate (PCC) Glu using 7T MRI and relating them to measures of neurodegeneration and cognitive performance. 13 cognitively normal elderly controls (NEC), 6 individuals with mild cognitive impairment (MCI), and 7 with prodromal AD were studied. MRS data were acquired from the left hippocampus and PCC. Maps of fractional anistropy (FA) were obtained using diffusion weighted imaging and tractography was performed to find the white-matter tract connecting the MRS voxels. Cognitive performance was assessed using the NACC Neuropsychological Battery. Hippocampal Glu (hGlu) was lower in MCI and AD compared to NEC ($p<0.05$), replicating previous findings. Tract FA was lower in AD compared to NEC ($p<0.05$), which may reflect a loss of neuronal density. hGlu was positively correlated with average tract FA ($r=0.59$) and with cognitive measurements including Figure Copy performance ($r=0.48$), suggesting that hGlu could be a biomarker of neuronal loss and cognitive performance in AD.

Platform 14

Abstract Title:

Identifying biomarkers associated with the development of hallucinations and delusions in Alzheimer’s disease: A multimodal neuroimaging and genetic analysis study

Author(s):

Juweiriya Ahmed, Sejal Patel, Lena Palaniyappan, Stephen Pasternak, Mario Masellis, Elizabeth Finger

Abstract:

The co-occurrence of neuropsychiatric symptoms and Alzheimer’s disease (AD) is a devastating phenotype (AD+P) that affects close to 50% of individuals with AD. We aim to use a multimodal approach to determine the relationship between the development of delusions and hallucinations in AD and changes in regional brain volume and genetic polymorphisms with known functional consequences in neurotransmitter systems. We hypothesize that the interaction between regional brain atrophy and genetic polymorphisms in neurotransmitter pathways leads to the development of delusions and hallucinations in AD. Using the Alzheimer’s Disease Neuroimaging Initiative, we analyzed brain volume and cortical thickness measurements obtained from magnetic resonance imaging (MRI). Our preliminary analysis of the MRI data has identified brain regions implicated in models of psychosis in other disorders. In step 2, we will determine if single nucleotide polymorphisms with known functional consequences in cholinergic, dopaminergic or glutamatergic neurotransmitter systems are associated with an increased risk of AD+P. Results of this study will help inform novel therapeutic targets for these symptoms in AD.

Platform 15

Abstract Title:

Visual velocity, temporal, and displacement perception in Parkinson’s disease analyzed using a computer generated graphic tool.

Author(s):

Matthew Bernardinis, Seyed Farokh Atashzar, Mandar Jog, Rajni V Patel

Abstract:

Minimal research has examined perceptual differences in Parkinson’s Disease (PD) without motor output production or the effect of Levodopa (LD). Our work examines visual displacement perception in PD with allocentric references, which are used for object recognition. We hypothesize PD patients will have impaired allocentric visual displacement perception. Perception was assessed with a virtual reality tool box, which ran two-forced alternative tests requiring participants to compare displacement distances of shapes. Following, the participant’s difference threshold (DL), which is inversely related to perceptual sensitivity was calculated. Patients were tested OFF and ON LD and measures were compared to non-PD age-matched controls. Subjects with PD showed significant impairments both ON and OFF LD at the larger tested displacement magnitudes compared to controls; however, there was no significant differences at the smaller tested displacement magnitudes. These results indicate potential impairments in the ventral visual processing stream in PD which is not aided by LD. This may explain observed facial recognition deficits and visual spatial impairments in PD.

Platform 16

Abstract Title:

Role of baseline dorsal and ventral striatum activity in stimulus-response learning in patients with obsessive compulsive disorder

Author(s):

Nole M. Hiebert, Marc Lawrence, Adrian M. Owen, Mark Watling, Ken N. Seergobin, and Penny A. MacDonald

Abstract:

Dorsal striatum (DS) has long been implicated in stimulus-response learning, though recent results challenge this notion. Obsessive compulsive disorder (OCD) is a prevalent psychiatric disorder characterized by obsessions and compulsions. Studies investigating OCD frequently implicate the DS and ventral striatum (VS). The main aim of this study was to dissociate the roles of DS and VS in decision making and learning in patients with OCD to better clarify DS and VS function, as well as understand how DS and VS dysfunction might lead to OCD symptoms. We found that patients with OCD exhibited decision making and learning deficits compared to controls. Along with these behavioural deficits, OCD patients had reduced task-relevant activity in DS and VS, compared to controls. In healthy controls, activity in DS arose during response selection and correlated with decision making and not learning, however. When rest activity was separately investigated, activity in VS, and not DS, was significantly higher in patients with OCD compared to controls. This study suggests that DS does not mediate stimulus-response learning and sheds light on the cognitive deficits experienced by OCD patients.

Platform 17

Abstract Title:

Assessing cognitive function and brain health in older adults at-risk for diabetes

Author(s):

Joyla Furlano, Lindsay Nagamatsu

Abstract:

Older adults with type 2 diabetes (T2D) experience cognitive decline and cerebral atrophy, and therefore are at high risk for developing dementia. Consequently, older adults at-risk for T2D (based on body mass and blood glucose levels) are at higher risk for cognitive decline. Pre-diabetic older adults have been shown to experience some cognitive decline, however further research is needed to determine the specific cognitive domains affected and the degree to which this decline occurs. Moreover, structural and functional brain changes that may occur with these deficits is currently unknown in this population. To address these gaps in the literature, we conducted a cross-sectional analysis of older adults (aged 60-80) at-risk for diabetes (BMI > 25 or blood glucose of 6.1-7.0 mmol/L) and healthy aged-matched controls, examining cognition, functional brain activation (as measured by fMRI), and structural brain patterns. Based on our cross-sectional analysis, older adults at-risk for diabetes show impaired executive functioning and memory performance, as well as altered brain structure and function that may contribute to the observed deficits.

Platform 18

Abstract Title:

Next-generation sequencing to investigate transcriptomic changes in cortical samples from living Parkinson’s patients

Author(s):

Simon M. Benoit, Hu Xu, Roumiana Alexandrova, Gaganjot Kaur, Bhooma Thiruvahindrapuram, Matthew O. Hebb

Abstract:

Differential gene expression in the central nervous system (CNS) of living Parkinson’s disease (PD) patients has not been previously reported and may offer critical new biomarkers to help understand, diagnose and potentially modify the disease. Total RNA extracted from cortical biopsies in 6 PD patients and 6 controls was sequenced and analyzed for differential expression using edgeR (v.3.8.6). Pathway enrichment and induced network modules analyses were performed using several freely available analysis tools including ConsensusPathDB and Cytoscape. At an FDR threshold of <0.05, 763 differentially expressed genes were identified. Pathway analysis showed enrichment of genes responsible for regulating inflammatory response processes, tumor necrosis factor production and the innate immune response including IL-10, IL-1B and CD44. Interestingly, induced network analysis revealed a robust network surrounding the NF-κB complex. This is the first known demonstration of differential CNS gene expression in living PD. Findings of nearly 800 altered genes may lead to new biomarkers which may become critical tools in the management of PD and other neurodegenerative diseases.

Platform 19

Abstract Title:

Clarifying Dopaminergic Projections of the Ventral Tegmental Area and Substantia Nigra in Humans using Structural Magnetic Resonance Imaging

Author(s):

Nicholas Handfield-Jones, Erind Alushaj, Nole H Hiebert, Adrian M Owen, Ali R Khan*, Penny A MacDonald*

Abstract:

Substantia nigra pars compacta (SNc) and ventral tegmental area (VTA) dopaminergic projections to the striatum and the cortex mediate movement and cognition, but the pattern of these connections in humans is poorly understood. This study aims to a) determine if these projections can be tracked in living participants using ultra-high field magnetic resonance imaging (MRI), and, if so, to b) explore SNc and VTA connectivity to striatum and cortex.

18 healthy participants were scanned twice, once in 3-Tesla (3T), and once in 7-Tesla (7T). T1-weighted anatomical scans and diffusion tensor imaging (DTI) scans were obtained from both machines. The SNc and the VTA were manually outlined on T1 images, then parcellated into executive, caudal-motor, rostral-motor, and limbic sub-regions based on their connections to a striatum parcellation profile previously determined by our lab. White matter probability maps were then generated for each SNc and VTA sub-region to determine their structural connectivity to striatum and cortex.

Early analysis of 3T data seems to suggest that DTI MRI can track SNc and VTA projections and that they both target a wide range of striatal and cortical sub-regions.

Platform 20

Abstract Title:

Long-Term Outcomes in the Management of Central Neuropathic Pain Syndromes: A Prospective Observational Cohort Study

Author(s):

Michael D. Staudt, A. John Clark, Allan S. Gordon, Mary E. Lynch, Pat. K. Morley-Forster, Howard Nathan, Catherine Smyth, Larry W. Stitt, Cory Toth, Mark A. Ware, Dwight E. Moulin

Abstract:

Background: Central neuropathic pain syndromes are a result of CNS injury, and are much less common than peripheral etiologies. The objective of this study was to determine the long-term clinical effectiveness of the management of central relative to peripheral neuropathic pain.

Methods: Patients diagnosed with central (n=79) and peripheral (n=710) neuropathic pain were identified from a prospective observational cohort. Data were collected at baseline and 12-month follow-up. The primary outcome was the composite of reduced average pain intensity and pain interference. Secondary outcomes included assessments of function, mood, and quality-of-life.

Results: At 12-month follow-up, 13.5% of patients achieved 30% reduction in pain, whereas 38.5% achieved a 1 point reduction in pain interference, with 9.6% of patients achieving both these measures. Patients with peripheral neuropathic pain were more likely to achieve this primary outcome at 12-months (25.3% of patients) (p=.012).

Conclusion: Patients with central neuropathic pain were less likely to achieve a meaningful improvement in pain and function compared to patients with peripheral neuropathic pain at 12-month follow-up.

Poster 1

Abstract Title:

Can meditation strategies improve attention in older adults with a history of falls?

Author(s):

Sabrina Ford, Lindsay Nagamatsu, PhD

Abstract:

Falls in older adults are a major concern given the resulting injuries and medical costs. Past literature suggests that recurrent falls among older adults are not merely accidents, but rather caused by intrinsic factors, such as poor attention. A strategy that can improve attention is meditation. Meditation can be defined as bringing awareness and focus to the present moment. Therefore, our current study examines whether using meditation training in older adults with a history of falls would improve their attention. We are conducting a four-week intervention where participants are randomly assigned to either a focused attention (FA) meditation condition, or an acoustic music listening (control) condition three times a week. Before and after the four-week intervention we assess attention using the Sustained Attention to Response Task (SART) and EEG where we measure alpha peak frequency (iAPF). Our results are expected to show a significant improvement in SART performance and increase in iAPF in the meditation group compared to the controls, suggesting that FA meditation can increase attention in older adults and possibly decrease their risk of falls and falls-related injuries.

Poster 2

Abstract Title:

Brain Magnetic Resonance Imaging (MRI) Susceptibility Artifacts Post Cardiac Surgery in Children

Author(s):

Ahmad Alanezi, Craig Campbell, Keng Tay, Eva Welisch, Andrea Andrade

Abstract:

Magnetic susceptibility artifact (MSA) on the brain MRI is recognized as a sign of blood, calcium or metallic material in the brain. In the case of the former two situations the list of pathophysiologic scenarios are more familiar to most neurology practitioners. However, metallic material in the brain is rare and has a very limited, usually iatrogenic or traumatic, etiology. Recently a situation of multiple minute metallic signal change has been described in few studies in adult population as an incidental finding in patients who underwent cardiac surgery, catheterization or had a prosthetic cardiac valve. In pediatric population there are few cases reported who had similar brain MRI findings. We present three children with incidental finding of susceptibility artifacts in brain MRI post cardiac surgery. Potentially, the suggested mechanism is metallic micro-emboli or micro-hemorrhage with subsequent hemosiderin deposition during or after cardiac intervention. MSA might present in a greater number of children underwent cardiac interventions. Although they could be associated with adverse neurodevelopmental outcome, further studies needed to establish their cause and association.

Poster 3

Abstract Title:

Prevalence of autoimmune disorders in frontotemporal dementia and related disorders

Author(s):

M. Thiyagarajah, E. Finger

Abstract:

Recent discovery of the association between genetic mutations affecting immune function (TRE3M2, progranulin) and increased risk of Alzheimer's disease (AD) and frontotemporal dementia (FTD) has renewed interest in the role of neuroinflammation in the pathogenesis of neurodegenerative diseases. In particular, frontotemporal lobar degeneration (FTLD) with transactive response DNA-binding protein 43 (TDP-43)-associated ubiquitin-immunoreactive inclusions has been associated with comorbid autoimmune disease (Miller et al. 2013). We aimed to confirm the hypothesis that patients with likely FTD-TDP-43 would show increased prevalence of autoimmune diseases compared to other neurodegenerative dementias. 71 participants have completed autoimmune checklists to date. No significant relationship between diagnosis (AD vs. FTD vs. LBD-PD) and presence of autoimmune disease was found, Ï‡2(2, N=71) = 2.26, p = .36. However, autoimmune disease frequencies in our cohort are in line with the higher prevalence in patients with svFTD reported by Miller and colleagues (2013). Further exploration of autoimmune dysregulation in FTD subtypes could provide novel therapeutic targets.

NOTE: The paper referenced in the abstract above:

Reference: Miller, Z. A., Rankin, K. P., Graff-Radford, N. R., Takada, L. T., Sturm, V. E., Cleveland, C. M., ... & Hsu, S. C. (2013). TDP-43 frontotemporal lobar degeneratio

Poster 4

Abstract Title:

Assessing Cardiac Dysfunction Post-Stroke in the Insular Cortex Ischemic Stroke Rat Model

Author(s):

Victoria Jaremek, Brittany Balint, Victoria Thorburn, Maryse Paquet, Jamie Melling, Luciano A. Sposato and Shawn N. Whitehead

Abstract:

Patients who have suffered an ischemic stroke with damage to the right insular cortex (IC) may develop secondary myocardial injury. However, the pathophysiology and time course of these post-stroke cardiac changes require further investigation which is complicated by lack of pre-clinical models. The purpose of this work is to establish a pre-clinical model of selective IC stroke to evaluate post-stroke cardiac effects. To do this, IC ischemic stroke was induced in 6-month-old male Wistar rats via unilateral stereotaxic injection of endothelin-1 into right IC. Hearts were histologically examined at 6, 24 h, 7, 14 and 28 d post-stroke for fibrosis (Masson’s Trichrome stain), inflammation (myeloperoxidase, CD3+, CD45R immunostaining) and phosphorylated endothelial nitric oxide synthase. Areas of interest included 4 heart chambers and pulmonary vein/left atrium border (PV-LA border). Results showed that focal IC stroke led to increased PV-LA border neutrophil infiltration at 6 h and tissue fibrosis at 14 and 28 d. These findings provide insight into the progression of post-stroke cardiac changes and suggest that inflammation is a treatable target to prevent cardiac changes post-stroke.

Poster 5

Abstract Title:

Investigating anatomical regions in which myelin abnormalities occur in schizophrenia using high resolution quantitative R1 maps

Author(s):

Hossein Rejali, Penny Gowland, Peter Liddle, Ali Radaideh, Lena Palaniyappan and Ali R. Khan

Abstract:

Introduction: It is well known that there are myelination abnormalities present in schizophrenia population from ex-vivo studies, although validation of such abnormalities currently has not been investigated using in-vivo data in high-resolution MRI. In the past, quantitative mapping of longitudinal relaxometry, T1, or 1/R1 has been used to investigate myelin content in the cortex. Hypothesis: We hypothesize that quantitative R1, which measures myelin content, would be reduced in patients with schizophrenia compared with controls. Method: In this study, R1 Maps were collected for 20 controls and 21 diagnosed with schizophrenia. We modelled R1 accounting for age, gender and a discrete group variable, control or schizophrenia, as covariates affecting myelin. We then tested for differences in R1 intensities between control and patients with schizophrenia in the specified mean ROIs using F statistic hypothesis testing.Results: Due to the limited number of subjects and field of view, our preliminary results showed no significance in regions investigated ($p<0.05$) between the two groups. Further analysis and investigation is required to validate what has been stated by previous literature

Poster 6

Abstract Title:

Development of an Insular Ischemic Stroke Animal Model to Study the Pathophysiology of Atrial Fibrillation Detected after Stroke (AFDAS)

Author(s):

Victoria Thorburn, Brittany Balint, Maryse Paquet, Shawn N. Whitehead and Luciano A. Sposato

Abstract:

Atrial fibrillation (AF) increases risk of ischemic stroke 5-fold. Recent evidence suggests stroke can generate AF. It is thought that stroke involving the insular cortex (IC) initiates AFDAS, but exact mechanisms remain unknown. We hypothesize AFDAS is the consequence of IC damage occurring after stroke, which disrupts autonomic regulation of heart rhythm. As a first step of an overall initiative to evaluate the pathophysiology of AFDAS, we aimed to create a rat model of focal IC ischemic stroke. Stroke was induced into the insular cortex of male Wistar rats through stereotaxic injection of endothelin-1 (n=8). Control groups received saline injection (n=7) or no injection (n=6). Heart and brain tissue were analyzed for left atrial fibrosis (LAF) and neuroinflammation at 28 days post-stroke. LAF was greater in animals with IC stroke, compared to IC saline injection and no injection controls. Furthermore, extensive widespread neuroinflammation was observed in IC stroke animals. With this model we have successfully identified several downstream consequences of insular stroke, providing further insight into potential AFDAS mechanisms and future therapeutic targets.

Poster 7

Abstract Title:

Ventricular volume in Frontotemporal Dementia and genetically at-risk family members: results from the GENFI study

Author(s):

Tamara P Tavares, Derek Mitchell, Kristy Coleman, Christen Shoesmith, Robart Bartha, David M. Cash, John van Swieten, Barbara Borroni, Daniela Galimberti, Maria Carmela Tartaglia, James Rowe, Caroline Graff, Fabrizio Tagliavini, Giovanni Frisoni, Stefano Cappa, Robert Laforce Jr, Alexandre MendonÃ§a, Sandro Sorbi, Martin N Rossor, Mario Masellis, Jonathan D Rohrer, Elizabeth Finger on behalf of the Genetic FTD Initiative, GENFI

"Abstract:

Frontotemporal Dementia (FTD) is a heritable neurodegenerative disorder. As clinical trials of potential disease modifying treatments are anticipated, it is pertinent to identify biomarkers sensitive to early neuronal loss to be used as surrogate outcome measures to assess the effectiveness of treatments. Ventricular volume is recognized as a biomarker in Alzheimer’s disease to identify individuals at-risk for developing the disorder and to index disease progression; however, no study has assessed ventricular volume expansion in presymptomatic mutation carriers in FTD. The current study addresses this knowledge gap by delineating the progression of ventricular expansion in cohort of n=127 individuals with a family history of genetic FTD, including symptomatic mutation carriers, presymptomatic mutation carriers and mutation non-carriers. Significant differences between presymptomatic mutation carriers and non-carriers in total ventricular volume was found four years prior to expected symptom onset. Ultimately, these results demonstrate the feasibility of ventricular volume as a biomarker to (1) detect at-risk individuals and (2) assess the effectiveness of future treatments.

Poster 8

Abstract Title:

Diagnostic And Prognostic Trends In Stroke Patients With Carotid Free Floating Thrombus: A Systematic Literature Review.

Author(s):

Sebastian Fridman, Stephen P. Lownie, Jennifer Mandzia,

Abstract:

Background

Carotid free-floating thrombus (CFFT) initial descriptions diagnosed CFFT by conventional angiography. Recently, Reports of CFFT have increased with the widespread use of computed tomographic angiography for acute stroke after the CFFT. We aimed to compare the outcomes and methods of diagnosis through fifty years.

Methods

Following PRISMA guidelines, we searched MEDLINE, EMBASE from 1960 through June 2017. We compared diagnostic methods and evaluated 30-day outcomes by decade of publication by using logistic and cox regression.

Results

A total of 141 manuscripts met entry criteria, reporting 525 patients. Increased utilization of CT angiography (CTA, OR=4.05, 95%CI 1.06-15.38, p=0.04) was associated with decade of publication after adjusting to risk factors, clinical presentation and treatments. Decreased short-term risk of any vascular event or death (OR=0.48, 95%CI 0.31-0.74, p=0.001) was associated with decade of publication after adjusting to risk factors, clinical presentation and treatments.

Conclusion

The CFFT diagnosis method in stroke patients is shifting from conventional angiography toward CTA and DUS, and short-term risk has been decreasing through time.

Poster 9

Abstract Title:

The psychophysiology of guilt

Author(s):

Chloe A Stewart, Derek GV Mitchell, Penny A MacDonald, Richard WJ Neufeld, Elizabeth C Finger

Abstract:

Guilt is a negative social emotion, elicited by realizing that one has caused harm to another person. Guilt is anecdotally described as a visceral experience, yet little is known about the characteristics of guilt in the autonomic nervous system (ANS). We aim to identify the specific ANS patterns associated with experiencing guilt. 34 healthy adults undertook a novel task including a questionnaire about their habits and attitudes, and videos eliciting guilt and five comparison emotions. Participants' swallowing rate, galvanic skin response, heart rate, respiration rate, and gastric activity rate were monitored. Participants completed the Guilt Inventory and Empathy Quotient to assess trait guilt and empathy. Preliminary results indicate that heart rate variability when feeling guilty is significantly related to trait empathy, r=.441, p=.024. This correlation was not found when viewing neutral videos, r=.338, p=0.092. We aim to determine how guilt's autonomic profile compares to other emotions. This may identify treatment targets for modulation of guilt in neurologic and psychiatric disorders with deficient or elevated levels of guilt such as frontotemporal dementia, PTSD, and OCD.

Poster 10

Abstract Title:

Pseudoglandular schwannoma causing cauda equina syndrome: a case report

Author(s):

Suzy Kosteniuk, Aravind Ganesh, Nima Kashani, Nicholas Wiebe

Abstract:

Background: Schwannomas are common, benign nervous system neoplasms. Many morphological varieties of schwannoma exist. Pseudoglandular schwannomas are an exceedingly rare variant, in which pseudocystic spaces are lined by Schwann cells.

Case: A previously healthy 63 year old male presented with a four month history of progressive bilateral leg pain and acute urinary retention. Lower extremity gross motor and sensory examinations were unremarkable. MRI revealed a 2.2 cm x 1.7 cm x 0.7 cm ring-enhancing, intradural, extramedullary, cystic lesion at L1, displacing and effacing the cauda equina. The differential diagnosis following imaging included arachnoid cyst, epidermoid cyst, neurenteric cyst, and cystic schwannoma. The patient successfully underwent a T12 to L1 laminectomy for tumour removal, and his symptoms resolved. Pathology revealed a WHO grade I schwannoma with extensive pseudocystic spaces lined with strongly S100-positive spindled cells.

Conclusions: This unusual case highlights the wide morphologic diversity of schwannoma.

Poster 11

Abstract Title:

Preclinical evaluation of progenitor cells from the living parkinsonian brain: potential for cell-based therapy

Author(s):

Simon M. Benoit, Hu Xu, Nivin Nystrom, Katie Parkins, Amanda Hamilton, John Ronald, Tim Scholl, Paula Foster, Susanne Schmid, Matthew O. Hebb

Abstract:

Brain biopsies from living PD patients, taken during deep brain stimulation surgery, can yield large numbers of brain-derived progenitor cells (BDPCs). These cells have key merits of being both host-derived progeny and endogenously expressing neurotrophic factors; key modulators of cell survival. This raises the prospect that BDPCs may effectively integrate back into the brain to confer enduring therapeutic function in PD, but preclinical transplant models are a necessity. In our study, human BDPCs were grafted into immunocompromised NSG mice and Fischer rat BDPCs transplanted into syngeneic rodents. Both cell populations were first labelled to allow in vivo BDPC tracking using a 3T MRI and bioluminescence imaging(BLI). Xenografted human BDPCs in a pilot cohort of NSG mice show a stable BLI signal and MRI signal void for 6 weeks. Fischer rat syngeneic grafts also showed BLI signal over 2 weeks and were easily localized on MRI. This work provides novel insight into the viability of BDPCs in xenograft and syngeneic models. Using brain tissue from living PD patients has the potential to provide unparalleled contributions to the development of personalized therapeutics for PD.

Poster 12

Abstract Title:

Perception of low-grade glioma growth on serial imaging

Author(s):

Chloe Gui, Jonathan C. Lau, Joseph F. Megyesi

Abstract:

Background

Diffuse low-grade gliomas (LGGs) are brain tumours that grow slowly but constantly before evolving into aggressive high-grade gliomas. Growth parameters provide prognostic value; smaller and slower-growing LGGs confer better outcomes.

Methods

Radiology reports (n = 111) for MRIs of 11 LGGs were analyzed, and interpretations of tumour growth were categorized into no change (n = 73) or change (n = 38). Actual tumour volume was measured by manual segmentation on MRI.

Results

Measurements revealed a median volume growth of 3.90 mL (11.0%) compared to previous imaging in tumours that were classified as no change. Among tumours that were interpreted as having grown, a median growth of 9.36 mL (20.5%) was measured. The measured volume increase in LGGs classified as having grown was greater than that of LGGs classified as stable ($p < 0.0001$).

Conclusion

Assessment of LGG growth by visual inspection can underestimate tumour expansion, especially if only recent scans are compared. Considering the prognostic value of LGG growth and the relative inaccuracy of qualitative observation, longitudinal volumetric analyses of LGGs should be considered by neuro-oncological teams.

Poster 13

Abstract Title:

Effects of BoNT-A Injections in the Subthalamic Nucleus of a Hemi-Parkinsonian Rat Model

Author(s):

Olga Khazov, Dr. Mandar Jog, Dr. Nagalingam Rajakumar

Abstract:

Parkinson’s disease (PD) is a neurodegenerative disorder characterized by death of dopaminergic neurons in the substantia nigra pars compacta, which leads to basal ganglia circuitry (BGC) dysfunction, leading to motor impairments. Botulinum neurotoxin type A (BoNT-A), which primarily blocks the release of excitatory neurotransmitters will be injected into the subthalamic nucleus (STN), an area hyperactive in PD which receives excitatory glutamatergic input from the cortex. Injection of BoNT-A at the STN is hypothesized to reduce its hyperactivity, thus bringing BGC to healthier outputs, resulting in motor improvements. This intervention has potential as a new treatment option for PD. The research objectives are to examine the effects of BoNT-A injection in a hemi-PD rat model by quantifying motor changes in spontaneous movement, forced movement, and drug induced movement at various time points. Neuro-anatomical and molecular changes through immunohistochemistry, as well as a time/dose-response of BoNT-A will be examined. Hemi-PD was induced by 6-OHDA injection into the right medial forebrain bundle. Data is currently being collected and preliminary findings will be presented.

Poster 14

Abstract Title:

Comparing the efficacy of image-guidance methods for ventricular catheterization: A meta-analysis of Ommaya reservoir procedures

Author(s):

Jonathan C. Lau, Suzanne E. Kosteniuk, Thomas Walker, Alla Iansavichene, David R. Macdonald, Joseph F. Megyesi

Abstract:

Background

Consolidating evidence on the utility of image guidance (IG) in neurosurgery remains an important endeavour particularly in the context of growing concerns about healthcare rationing. We sought to compile evidence about surgical outcome in Ommaya reservoir insertion (ORI) procedures using IG.

Methods

A systematic review and meta-analysis was conducted in accordance with PRISMA guidelines. We compared frameless versus frame-based stereotaxy and optical versus electromagnetic tracking.

Results

A total of 42 studies met study criteria (1995 ORI procedures). We observed that IG ORI resulted in decreased complications compared to non-IG. Rates of early infection and any infection were increased with frame-based compared to frameless IG at 1.9% versus 0.0% and 11.1% versus 3.1% for early and any infection respectively. Further stratification of frameless IG based on modality did not reveal any statistically significant differences.

Conclusion

Our analysis provides objective support for IG in ORI. Overall, the choice of IG did not impact complication rates, although a slight increase in risk of infection was identified with frame-based insertion.

Poster 15

Abstract Title:

Differentiating the Ventral Tegmental Area and Substantia Nigra in Parkinson’s Disease Using Magnetic Resonance Imaging

Author(s):

Erind Alushaj

Abstract:

The midbrain dopaminergic system plays a major role in Parkinson’s disease (PD), with substantia nigra pars compacta (SNc) degeneration causing motor symptoms. There are no validated biomarkers of PD, but magnetic resonance imaging has great potential for their discovery. Our lab found the caudal motor sub-region of the striatum is atrophied in PD - a potential diagnostic biomarker. Striatum biomarkers appear too late for the development of preventative treatment. Midbrain biomarkers might be the solution to this problem by uncovering pre-clinical changes that predict PD. This study aimed to parcellate the SNc and ventral tegmental area (VTA) at 3T and 7T to search for PD biomarkers. We hypothesized the caudal motor sub-region of the SNc is first to degenerate in PD based on previous findings in the striatum. Using probabilistic tractography, we parcellated the VTA and SNc based on reciprocal connections with the striatum. Volume and fractional anisotropy measures were compared between early-stage PD patients and age-matched controls. Preliminary findings suggest VTA and SNc parcellation is feasible even at 3T with indications of degeneration in the SNc caudal motor sub-region.

Poster 16

Abstract Title:

Feeling Green: Case report of Pediatric Cerebellar Myeloid Sarcoma and Review of Literature

Author(s):

Ghare, A, Langdon K, Andrade A, Kiwan R, Hammond R, Ranger A

Abstract:

Myeloid sarcoma (MS) is a rare solid tumour made of myeloblasts or immature myeloid cells in an extramedullary site or in bone, associated with systemic hematologic neoplasms. Central nervous system myeloid sarcomas are rare, with 178 published cases in the literature. When they occur in the brain parenchyma, they can often be misdiagnosed. The authors report a case of a 4-year old boy 6 months out of remission from AML, presenting with a short history of headaches and vomiting, and found to have a heterogenous contrast-enhancing lesion in the right cerebellar hemisphere, with differential diagnosis of myeloid sarcoma, astrocytoma, medulloblastoma and ATRT. Preliminary diagnosis was made from flow cytometry from an intraoperative biopsy, highlighting the need for multifocal histopathological diagnosis in an urgent fashion to prevent unnecessary tumour debulking. The patient had a long course of chemotherapy and radiation, but eventually died from the systemic burden of his AML. A review of the literature on CNS myeloid sarcomas, their radiological presentation and the basis of immunohistochemical and pathological diagnosis is discussed.

Poster 17

Abstract Title:

Investigating the Utility of Current Steering for Treating Parkinsonian Gait

Author(s):

Daphne Hui

Mandar Jog

Abstract:

Current steering (CS) addresses varying responses of Parkinsonian gait (PG) to subthalamic nucleus (STN) deep brain stimulation by shaping electric fields to target STN somatotopy. We hypothesized that CS improves PG more than non-CS stimulation. Five patients were assessed by the Unified Parkinson's Disease Rating Scale (UPDRS) and sensors recorded gait with 70/30 and 50/50 CS divisions. Uni and bilateral means of step length and time, stride velocity, and double support time were normalized to baseline and leg length. Fast pace walking with stimulation near 40% of the therapeutic window elicited significant increases of step length and stride velocity when right sided CS and bilateral non-CS were compared to bilateral CS. Majority of the lowest UPDRS scores followed right sided CS and the rest followed without CS. Improvements elicited by right sided CS may address disease asymmetry or show the right hemisphere's role in posture control. Improvements also manifested without CS; thus, it is elusive whether CS improves PG more. Future comparisons of CS influencing poor versus accurate contact localizations may assess its specific use and accounts for patient specific responses.

Poster 18

Abstract Title:

Correlation of Objective and Subjective Measures in the Treatment of Cervical Spondylotic Myelopathy

Author(s):

McGregor, Stuart; Goncalves, Sandy; Detombe, Sarah; Bartha, Robert; and Neil Duggal.

Abstract:

Background: Cervical spondylotic myelopathy (CSM), a common condition characterized by slow compression of the spinal cord can produce varied symptoms ranging from diminished balance and dexterity, to quadraparesis and incontinence. There are no clear definitions of “success” for surgical management of CSM. The purpose of this study was to identify if CSM patients’ perceived outcomes correlated with objective findings.

Methods: A total of 45 patients underwent anterior or posterior decompression for CSM with completion of pre-operative and 6-month follow up assessments, including an ASIA neurological assessment, and subjective, patient derived outcome measures (mJOA, NDI and SF-36).

Results: Patients showed significant improvements in all tests ($p<0.001$). However, our objective measure did not correlate with any subjective measure pre- or post-operatively. All subjective scores correlated with each other pre- and post-operatively ($p<0.01$).

Conclusion: Objective scoring of post-operative outcomes did not match patient perceived outcomes in CSM. The ASIA neurological assessment may not truly assess the scope of neurological changes in CSM.

Poster 19

Abstract Title:

L-Dopa Alters The Process Of Auditory Regularity Detection

Author(s):

Abdullah Al Jaja, Bjorn Herrmann, Jessica Grahn, Penny A. MacDonald

Abstract:

Parkinson’s disease (PD) is a neurodegenerative disorder that affects a large subset of the population. While L-3,4-dihydroxy phenylalanine (L-Dopa) is the standard treatment for PD’s motor symptoms, it might have detrimental effects on some aspects of cognition. Regularity detection (RD), that is, detecting the emergence of a regular pattern in a busy environment, is an important ability for scene analysis. At the neural level, RD is represented as an enhancement of the sustained response, which is an evoked response that reflects sequence predictability. We hypothesized that PD patients and healthy controls given L-Dopa might experience overdosing of the striatum, and thus potentially disrupting RD (as indexed by a lack of sustained negativity in the EEG response to regular sequences). We recorded the sustained response, via EEG, from 19 PD patients and 15 age-matched healthy controls while listening to random and regular auditory stimuli both on and off L-Dopa. We found that dopaminergic medication significantly worsened the sustained response in PD patients and healthy controls. This suggests that the ability to detect regularity might be compromised upon introducing L-Dopa.

Poster 20

Abstract Title:

Long-term Experience with Occipital and Supraorbital Nerve Stimulation for the Various Headache Disorders - an Institutional Case Series.

Author(s):

Holger Joswig, Mahmoud Abdallat, Vahagn Karapetyan, Keith W. MacDougall, Paul E. Cooper, Andrew G. Parrent,

Abstract:

Objectives: To assess whether occipital and supraorbital nerve stimulation (ONS; SONS) results in long-term headache alleviation.

Materials and Methods: Retrospective analysis of 90 patients with migraine, cervicogenic headache, cluster headache, neuropathic pain of the scalp, tension-type headache and new daily persistent headache undergoing ONS (58.9%), SONS

(12.2%), or a combined ONS + SONS (28.9%) stage 1 (trial) and stage 2 (definite implantation). Relative change in visual analog scale (VAS) pain was displayed graphically over time and significances tested using the t-test.

Results: 57 out of 90 patients (63.3%) were treatment-responders to a stage 1 trial with reduction of their average VAS pain to 35.8±24.8% of baseline (non-responders 99.1±24.1%; $p<0.01$). Following stage 2 (75.8±33.8 minutes surgery time; 170±116.8 rad*cm2 radiation exposure), average VAS pain remained <50% of baseline on long-term follow-up for up to 10 years. 2 patients (3.5%) requested hardware explantation. Stage 2 complications were 1 infection (1.8%) and 4 electrode dislocations (7%).

Conclusions: Clinically meaningful long-term benefit can be achieved with ONS/SONS in chronic headaches patients.

Poster 21

Abstract Title:

Evaluating the Positive Predictive Value of Onconeural Antibody Testing in Patients with Suspected Paraneoplastic Neurologic Syndromes

Author(s):

Adrian Budhram, Michael W. Nicolle, Liju Yang

Abstract:

BACKGROUND: Paraneoplastic neurologic syndromes are inflammatory diseases of the nervous system that occur as an indirect effect of malignancy, and are often associated with onconeural antibodies. We retrospectively evaluated the positive predictive value (PPV) of onconeural antibody testing at LHSC.

METHODS: We identified all patients who had undergone onconeural antibody screening at our institution from 2015 to 2017. A chart review was performed on all patients who had a positive onconeural antibody screen. The presence of an onconeural antibody was considered a false positive if no malignancy was diagnosed and an alternative etiology for the patient's neurologic symptoms were identified. The proportion of true positives (PPV) was then calculated.

RESULTS: On review, 308 patients underwent onconeural antibody testing. Twenty-three patients (7.5%) tested positive for an onconeural antibody, fourteen of which were false positives. The PPV for onconeural antibody testing was 39%.

CONCLUSION: Onconeural antibody testing may have a low positive predictive value. A thorough search for alternate diagnoses should be performed, even in patients with positive onconeural antibody testing.

Poster 22

Abstract Title:

Histology to Ultra-High Field MRI Registration of a Human Cadaveric Subcortex: Workflow Model

Author(s):

John P. Demarco, Jonathan C. Lau, Ali R. Khan

Abstract:

Deep Brain Stimulation (DBS) is an effective therapy that is used for the treatment of Parkinson’s Disease (PD) and other movement disorders. Through the development of higher resolution templates and atlases, DBS targeting can be performed with higher accuracy. Below we discuss the workflow for the creation of a 3D histological atlas using UHF MRI Registration. First, the cadaveric brain was scanned in-situ using 7 Tesla (T) Magnetic Resonance Imaging (MRI) at a resolution of 500 μm. The brain was extracted and imaged ex-vivo again with 7T MRI. The subcortical hemispheres were isolated and imaged individually at 7T using a multi-echo GRE sequence at 300 μm resolution. Each subcortex was then histologically processed into 8 μm thick sections and stained with hematoxylin and eosin. Finally, Histology-to-MRI registration was performed, allowing for reconstruction of histological sections back into the MRI space. preliminary results of the this atlas suggest that our histology to MRI registration pipeline needs to be modified to fit the demands of the subcortex, however histological data allowed for clear delineation of nuclei. We hope further development of this atlas can help plan DBS.

Poster 23

Abstract Title:

Predictors of Vocational Status Among Persons with Multiple Sclerosis

Author(s):

Dhwanil Bhatty, Mervin Blair, Swati Mehta, Sascha Gill, Sarah A. Morrow,

Abstract:

Multiple Sclerosis (MS) can result in physical, psychosocial, and cognitive impairments which can influence the ability to retain employment. We aimed to determine significant predictors of vocational status among persons with MS (PwMS) using a structural equation modeling approach. The following data was collected through a retrospective chart review: demographics and disease characteristics, vocational status, physical disability status, fine motor function, fatigue, depression, anxiety and cognitive function. The fit of the exploratory structural equation model to the data was examined using the comparative fit index, normal fit index , root-mean-squared error of approximation, and standardized root mean residual. There were 158 PwMS included in the analysis. The final model demonstrated that cognitive function ($\beta = 0.16$), physical disability ($\beta = -0.33$), and depressive symptoms ($\beta = -0.23$) significantly predicted vocational status ($ps<0.05$), explaining 37% of the variance and provided a good fit to the data. Interventions targeting physical disability, depressive symptoms, and reduced information processing should be prioritized to reduce work-related disability among PwMS.

Poster 24

Abstract Title:

High rate spinal nerve root stimulation for the treatment of chronic neuropathic pain

Author(s):

Michael D. Staudt, Keith W. MacDougall

Abstract:

Objectives: Neuropathic pain secondary to nerve root deafferentation can be difficult to treat via conventional dorsal column stimulation due to the involvement of surrounding dermatomal areas. We describe the combination of high frequency spinal nerve root stimulation (HF-NRS) as a novel treatment strategy for refractory neuropathic pain.

Methods: This is a retrospective study of patients with nerve root dermatomal pain who underwent NRS insertion and HF programming.

Results: 7 patients were analyzed (mean age: 58.4 years), with CRPS type 1 (n=4), abdominal or groin neuralgia (n=2) or post-herpetic neuralgia (n=1). Baseline pain was severe (mean VAS: 7.3) and long-standing (mean duration: 5.4 years). All patients were trialed with standard stimulation but preferred HF, whereas 3 patients crossed over. Pain control was comparable between parameters at 1.5 months (standard VAS: 2.5, HF VAS: 2.5) and 6 months (standard VAS: 2.7, HF VAS: 2.4).

Conclusions: NRS can effectively treat neuropathic pain syndromes difficult to capture with conventional dorsal column stimulation. HF-NRS is as efficacious as standard stimulation parameters without producing uncomfortable paresthesias.

Poster 25

Abstract Title:

Unfolded Hippocampal Coordinate System in 3D Histology

Author(s):

Jordan DeKraker, Kayla M. Ferko, Jonathan C. Lau, Stefan Kohler, Ali R. Khan

Abstract:

The hippocampus is implicated in several clinical neurological disorders and improved understanding of its complex structure can potentially impact diagnosis and therapy. In previous work, our lab developed a methodology for computationally unfolding the hippocampus in 3D in a way that respects its topology and inter-subject variability. This method was developed based 7T MR data that does not allow for visualization of micro-scale features that define the hippocampal subfields. In the current study, we explore the application of this computational unfolding to 40um 3D histology data in the 2015 BigBrain data release. Preliminary results show that: i) additional topological features can be captured in this dataset as compared to current in-vivo MRI, ii) cell density shows qualitatively similar patterns as T1-based intracortical myelin measures in the CA subfields but not subiculum, supporting the notion that both cell density and perforating white matter can contribute to T1, and iii) archicortical laminae are deformed by digitations, as in the neocortical gyri. Current and future work is focused further analysis of archicortical profiles in columns across the hippocampus.

Poster 26

Abstract Title:

Development of Brain Biopsy Simulator for Surgical Trainees

Author(s):

Abdul-Haseeb Naeem, Moath Abuaysha, Amirpouyan Namavarian, Lynn Denning, Stephen Lownie

Abstract:

Background: Surgical simulation is shown to be beneficial in training surgical residents. It is also desirable as it avoids the use of patients or costly cadavers for core surgical skill acquisition. One such surgical skill in neurosurgery is to successfully perform a brain biopsy using a Leksell frame. We present our progress in developing a brain biopsy simulation prototype for surgical trainees in Neurosurgery.

Results: A patient’s skull was segmented using Mimics software (Materialise NV, Leuven, Belgium) and printed using PRUSA multi-material (fused deposition modelling 3D printer) with PLA (polylactic acid) filaments. The cortex was segmented, casted into a mold and filled with composite hydrogel (Polyvinyl Alcohol and Phytagel). Composite hydrogel was selected as it closely resembles the tissue behaviour of the brain. Given the high costs of acquiring a new Leksell frame ($ 82,000) a replica was also 3D printed with help from Robarts Research Institute.

Conclusion: This research shows the feasibility of a constructing a high fidelity Leksell frame based brain biopsy simulation module. The next steps include clinical testing with to ensure validity and efficacy.

Poster 27

Abstract Title:

Activated B Cells Participating in the Anti-Myelin Response Are Excluded from the Inflamed Central Nervous System in a Model of Autoimmunity that Allows for B Cell Recognition of Autoantigen

Author(s):

Yodit Tesfagiorgis, Sarah Zhu, Rajiv W Jain, and Steven M Kerfoot

Abstract:

Once activated, T cells gain the ability to access both healthy and inflamed nonlymphoid tissues. They are then reactivated to remain in the tissue and exert their effector function only if they encounter their specific Ag. In this study, we set out to determine if the same is true for B cells using a mouse model of CNS autoimmunity that incorporates both T and B cell recognition of a myelin autoantigen. Both T and B cells were common infiltrates of spinal cords in diseased mice. However, unlike T cells, anti-myelin B cells were excluded from the inflamed tissue. Further, CNS B cells did not have a phenotype consistent with Ag-specific activation as it occurs in lymphatic tissue. Instead, they expressed elevated levels of CD80, indicating that B cells may contribute to local inflammation through nonantigen-specific mechanisms.

Poster 28

Abstract Title:

Two Distinct Clinical Phenotypes in a Family with ALSP Caused by a Novel CSF1R Mutation

Author(s):

Taylor, R.G, AlYamany B, Pandey S, Kertesz A, Ang L.C, Finger, E.

Abstract:

Adult onset leukodystrophy with axonal spheroids and pigmented microglia (ALSP) has emerged as a unifying diagnosis in patients with pathology demonstrating hereditary diffuse leukodystrophy with spheroids, and pigmented orthochromatic leukodystrophy. Clinically, patients with ALSP present with early neuropsychiatric dysfunction, motoric impairment, seizures, and a rapid clinical course. The neuropsychiatric phenotype of ALSP is heterogeneous and can mimic the behaviour variant of frontotemporal dementia or early onset Alzheimer's disease (AD), making diagnosis challenging. However, a distinct pattern of white matter disease, restricted diffusion, and cerebral calcifications on neuroimaging has emerged. Recently mutations in the colony stimulating factor 1 receptor (CSF-1R) gene have been shown to cause ALSP. We present two sisters with a previously unreported variant in CSF-1R (c.2563 C>T) with two distinct cognitive behavioural syndromes. The variable phenotypic presentation of ALSP despite identical CSF-1R mutations, as highlighted in this family, suggests key interactions between the mutation and other, as of yet, unidentified developmental, environmental or genetic modifiers.

Poster 29

Abstract Title:

Familial idiopathic Normal Pressure Hydrocephalus in a Canadian family

Author(s):

Basavaraj C Shettar, Seyed Mirsattari

Abstract:

Idiopathic Normal-pressure hydrocephalus (iNPH) is characterized by cognitive impairment, gait disturbance, enlarged ventricles with/without cerebral atrophy, with/without urinary incontinence, and normal cerebrospinal fluid pressure. Familial iNPH is very rarely described in the literature. A Canadian family with more than one generation of iNPH has never been described.

Patient 1: 50-year-old female presented with wide-based and magnetic gait, multiple falls with subsequent freezing. LP with large volume tap was performed.

Patient 2: 52 year male (brother): Presented with long-standing cognitive impairment and fatigue. Montreal Cognitive Assessment (MOCA) was performed. Whole exome sequencing(WES) of both siblings as well as an unaffected first cousin was done.

The father and grandmother of both patients was diagnosed with iNPH.

Results:Opening pressure on LP was normal in both patients. Imaging was consistent with hydrocephalus. First patient underwent VP shunt with good response. We present an undescribed Canadian family with iNPH in more than one generation. WES is underway for better understanding of genetic predisposition.