



**HALIFAX  
NEUROSURGERY**

**20  
19**

ANNUAL REPORT

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# Message from the Head of Neurosurgery

**DAVID B. CLARKE, MDCM, PhD, FRCSC, FACS**  
**Head, Division of Neurosurgery**

Welcome to Halifax Neurosurgery's Annual Report! This Report provides an opportunity to look back on the past year, to highlight notable events and to celebrate our achievements.

I first want to acknowledge people who are new to the Neuro family in the past year – welcome! You have joined a wonderful group of talented, hard-working, dedicated and fun individuals. Since training of the next generation of neurosurgeons is one of our most important responsibilities, I want to welcome our residents who have joined our Atlantic Canadian Neurosurgery Residency Program: Dr. Jenna Smith-Forrester and Dr. Abdulaziz Bokeris. We welcome these talented individuals to the best Neurosurgery residency program in the country, led by our new Director of the Residency Program, Dr. Gwynedd Pickett. I am also delighted to welcome our first Fellow in Stereotactic and Functional Neurosurgery, Dr. Carlos Rubio Restrepo, and his family to Halifax; kudos to Dr. Lutz Weise for the work he has done in establishing this Fellowship at Dalhousie.

Pediatric Neurosurgery continues to thrive at the IWK Health Centre under the leadership of Dr. Dan McNeely. The team has expanded with the successful recruitment of pediatric neuropathologist, Dr. Kate McFadden, from Ann Arbor, Michigan. Once again this year, the Neurosurgery Kids Fund sponsored a dozen children to attend Camp Brainiac, a one week summer camp for kids with neurosurgery conditions, at Brigadoon Village. I want to recognize the retirement of Marie MacNeil, whose career in neurosurgical nursing has been characterized by passion, compassion and service – she will be missed by the pediatric neurosurgical team.

Over the past year, our adult neurosurgical services at the QEII Health Sciences Centre have continued to enjoy strong support from our 7.3 unit manager Fran Kelloway, supported by our Director, Randi Monroe.

On our 7.3 in-patient unit on at the Halifax Infirmary, we continue to receive wonderful patient and family feedback about the amazing care our team provides. Learners who join us for training from across the country leave Halifax with gratitude for having had a high quality educational experience in a wonderfully supportive learning environment; kudos to all who teach!

We have had significant changes in our operating room (OR) nursing team. Jen Hoyt has provided energetic leadership of our OR nurses but recently left that position - fortunately for us, we will still see her in the OR in her new role working with Medtronic. Donna MacQueen, OR nurse, also retired from Neurosurgery after a long and stellar career – we all have had a chance to celebrate Donna's career at one or more of several parties! Our OR nursing team remains strong and, as we look for new leadership within that group, I am confident that Neurosurgery will continue to be a model of surgical care and an institutional leader in efficiently working together to provide the best patient care.

I am so proud of the excellent and highly-valued work being done at the IWK, the QEII and Dalhousie – in the clinics, in research, in the ORs, on the wards and in our offices. All this work is driven by our commitment to improving the lives of our patients. I want to thank our colleagues in various disciplines; neurosurgery is involved in many multidisciplinary efforts and we are very thankful for wonderful colleagues. And, finally, I want to acknowledge the ongoing interest and support of Halifax neurosurgical graduates who may be reading this report – you can be confident that the commitment to excellence in Neurosurgical patient care, research and education that you have been part of in the past is alive and well.

I hope you enjoy our 2019 annual report!

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# Neurosurgery Faculty



## **DAVID B. CLARKE** MDCM, PhD, FRCSC, FACS

- Head, Division of Neurosurgery
- Professor, Departments of Surgery, Medical Neuroscience, Medicine (Endocrinology) and Ophthalmology & Visual Sciences

### **Areas of Interest:**

- Transsphenoidal Surgery, Neuro-oncology
- Epilepsy Surgery
- Neurotrauma and Injury Prevention
- Neurosurgery Simulation/Education



## **SEAN CHRISTIE** MD, FRCSC

- Vice-Chair, Division of Neurosurgery
- Director of Research, Division of Neurosurgery
- Professor, Department of Surgery

### **Areas of Interest:**

- Minimally Invasive Spinal Surgery
- Complex Spinal Surgery
- Neurotrauma
- Sport-Related Neurological Injuries



## **GWYNEDD PICKETT** MD, FRCSC

- Associate Professor, Department of Surgery
- Program Director, Neurosurgery Residency Program

### **Areas of Interest:**

- Cerebrovascular Surgery
- Endovascular Treatment of Aneurysms



## **DANIEL MCNEELY** MD, FRCSC

- Chief, Pediatric Neurosurgery, IWK Health Centre
- Associate Professor, Department of Surgery

### **Areas of Interest:**

- Pediatric Neurosurgery
- Pediatric & Adult Epilepsy Surgery
- Spinal Dysraphism
- Hydrocephalus
- Intraventricular Neuroendoscopy

## Neurosurgery Faculty (cont'd)



**SEAN BARRY** MD, FRCSC

- Treasurer, Division of Neurosurgery
- Assistant Professor, Department of Surgery

**Areas of Interest:**

- Minimally Invasive Spinal Surgery
- Complex Spinal Surgery
- Spinal Oncology
- Neurotrauma



**SIMON WALLING** MBChB, FRCSC

- Assistant Professor, Department of Surgery

**Areas of Interest:**

- Neurotrauma
- Injury Prevention
- Neuro-Oncology
- Pediatric Neurosurgery
- Surgical Education



**ADRIENNE WEEKS** MD, PhD, FRCSC

- Assistant Professor, Department of Surgery

**Areas of Interest:**

- Cerebrovascular Diseases
- Endovascular Treatment of Aneurysms
- Neuro-Oncology



**JACOB ALANT** MBChB, MSc, MMed, FRCSC

- Assistant Professor, Department of Surgery

**Areas of Interest:**

- Minimally Invasive Spinal Surgery
- Peripheral Nerve Surgery



**LUTZ WEISE** MD, PhD

- Associate Professor, Department of Surgery

**Areas of Interest:**

- Functional Neurosurgery
- Movement Disorders
- Complex Pain
- Stereotaxy
- Neurophysiology
- Spinal Surgery

# Atlantic Canadian Neurosurgery Residency Program

**Director:** Dr. Gwynedd Pickett  
**Program Administrator:** Heather Munroe

The primary objective of the Atlantic Canadian Neurosurgery Residency Program at Dalhousie is the development of highly-skilled neurosurgeons who can practice anywhere in the world they choose. Residents are exposed to a broad range of clinical neurosurgery cases, with graduated levels of responsibility in patient care, as training progresses. The majority of cases are carried out with significant resident involvement, and at the senior resident level, independent clinical and operative decision-making is promoted. Training in professional, communication and health advocacy skills complement their technical education.

We strive to provide an academic environment in which residents are continually challenged and receive the regular, quality feedback necessary to refine their decision-making and technical skills. National changes to the post-graduate medical/surgical training curriculum, rolled out during the past couple of years, place greater emphasis on formative feedback and individual progression through levels of competence.



Dr. G. Pickett

The 1:1 ratio of faculty to residents at Dalhousie facilitates this, and enables mentoring in a collegial and respectful training environment. Regular teaching rounds and seminars create ample opportunities for in-depth discussion of neurosurgical cases and collaboration with colleagues in neurology, neuroradiology, and other surgical specialties.

The Atlantic Canadian Neurosurgery Residency Program is based in Halifax, Nova Scotia with rotations at the QEII Health Sciences Centre (adult) and the IWK Health Centre (pediatrics). Residents also pursue rotations at our affiliated Atlantic Canada neurosurgical sites in Saint John and Moncton, New Brunswick, and St. John's, Newfoundland & Labrador. This provides residents with exposure to a wide variety of neurosurgical problems and training experiences.

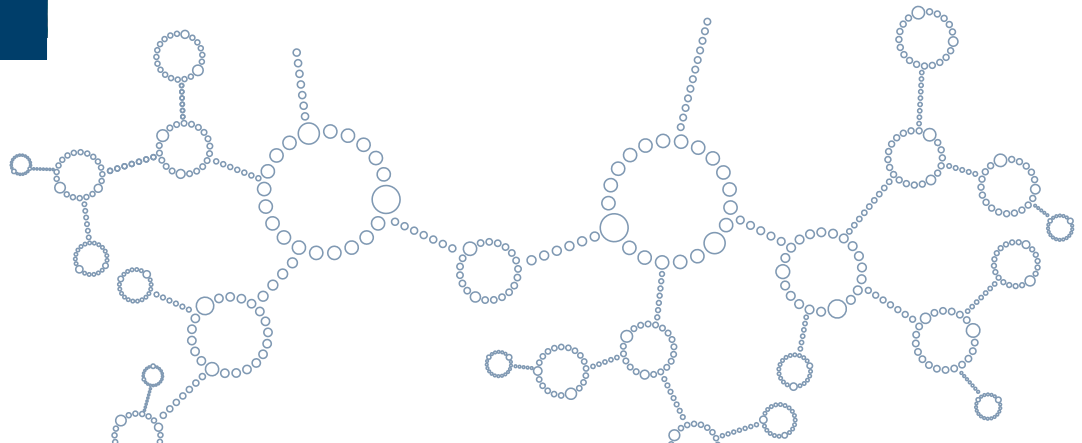
The Division of Neurosurgery strongly believes in the role of research in residency training, and we endeavor to facilitate resident involvement in research projects that suit their interests and support their individual career goals. We are committed to developing a multi-disciplinary approach to research including clinicians and basic scientists. Residents have the opportunity to enroll in Dalhousie University's Clinician Investigator Program (CIP), which provides structured research training that enables them to become clinician scientists upon completion of their residency.

There are currently nine neurosurgical residents in the program.

Congratulations to our Neurosurgery Graduating Residents and Fellow:

Congratulations to our Neurosurgery Graduating Residents Drs. John Adams, Aaron Robichaud and Fellow, Dr. Ayoub Dakson!

Best wishes!



# Neurosurgery Residents



## AARON ROBICHAUD MD

**MD Dalhousie University 2012 | Nova Scotia, Canada**

Dr. Robichaud obtained his Doctor of Medicine from Dalhousie University. Prior to studying medicine, Dr. Robichaud obtained a Bachelor of Science degree in Biology at Mount Allison University. He completed a Master's degree in Neuro-oncology in Dr. Adrienne Weeks' laboratory. Dr. Robichaud completed his residency training with Dalhousie University in 2019. He is currently completing a Fellowship in Skull Base Surgery at Greater Manchester Neurosciences Centre, Salford, U.K.



## JOHN ADAMS MD

**MD Memorial University 2013 | Newfoundland & Labrador, Canada**

Dr. Adams obtained his Doctor of Medicine at Memorial University. Prior to studying medicine, Dr. Adams obtained a Bachelor of Science Degree in Neuroscience. Dr. Adams completed his residency training with Dalhousie University in 2019, and has been recruited by the Neurosurgery Team in St. John's, NL.



## DAVID BRANDMAN MD (PGY6)

**MD University of Calgary 2010 | Alberta, Canada**

Dr. David Brandman obtained his Doctor of Medicine at the University of Calgary. Prior to studying medicine, he pursued a degree in biophysics at the University of British Columbia. Dr. Brandman did his PhD and post-doctoral research at Brown University studying intracortical brain-machine interfaces. He is expected to complete his residency training with Dalhousie University in 2020.



## OMAR ALSHARIF MBBS (PGY4)

**MD King Abdulaziz University 2012 | Jeddah, Saudi Arabia**

Dr. Alsharif obtained his Doctor of Medicine at King Abdulaziz University. He joined the Department of Neurosurgery at King Abdulaziz University as a teaching assistant in September 2012. In 2013, he began working as a research fellow at the University of Toronto on a scholarship before entering neurosurgical residency. Dr. Alsharif is pursuing a Master's degree in Community Health & Epidemiology. He is expected to complete his residency training with Dalhousie University in 2022.



## ALWALAA ALTHAGAFI MBBS (PGY4)

**MD King Abdulaziz University 2013 | Jeddah, Saudi Arabia**

Dr. Althagafi obtained his Doctor of Medicine at King Abdulaziz University. Prior to studying medicine, Dr. Althagafi pursued a Bachelor of Medical Laboratory Science at the University of Otago in New Zealand. He is expected to complete his residency training with Dalhousie University in 2022.



## ERIKA LECK MD (PGY3)

**MD Dalhousie University 2017 | Nova Scotia, Canada**

Dr. Leck obtained her Doctor of Medicine at Dalhousie University in 2017. Prior to studying medicine, Dr. Leck obtained a Bachelor of Science Degree (Honours) in Life Sciences at Queen's University. Dr. Leck is expected to complete her residency training with Dalhousie University in 2023.





### **MOSAAB ALSUWAIHEL** MBChB (PGY3)

**MD National University of Ireland 2015 | Dublin, Ireland**

Dr. Mosaab Alsuwaihel obtained his Bachelor of Medicine, Bachelor of Surgery and Bachelor of the Art of Obstetrics degrees in 2015 from the Royal College of Surgeons in Ireland. Dr. Alsuwaihel is expected to complete his residency training with Dalhousie University in 2023.



### **JAE HO HAN** MD (PGY2)

**MD Dalhousie University 2018 | Nova Scotia, Canada**

Dr. Han obtained his Doctor of Medicine at Dalhousie University in 2018. Prior to studying medicine, Dr. Han undertook a Bachelor of Science degree (Honours) in Biochemistry & Molecular Biology and Neuroscience at Dalhousie University. He is expected to complete his residency training with Dalhousie University in 2024.



### **MARK MACLEAN** MD, MSc (PGY2)

**MD Dalhousie University 2018 | Nova Scotia, Canada**

Dr. MacLean obtained his Doctor of Medicine at Dalhousie University in 2018. Prior to studying medicine, Dr. MacLean completed an MSc in Chemistry at Dalhousie University, followed by a year of clinical research in Geriatric Medicine. He is expected to complete his residency training with Dalhousie University in 2024.



### **JENNA SMITH-FORRESTER** MD, MSc (PGY1)

**MD University of British Columbia 2019 | British Columbia, Canada**

Dr. Smith-Forrester obtained her Doctor of Medicine at the University of British Columbia in 2019. Prior to studying medicine, Dr. Smith-Forrester completed a Bachelor of Science (with Distinction) in Neuroscience and Biology at Dalhousie University, followed by a Masters of Neuroscience at the University of British Columbia. She is expected to complete her residency training with Dalhousie University in 2025.



### **ABDULAZIZ BOKERIS** MBChB (PGY1)

**MD National University of Ireland 2017 | Dublin, Ireland**

Dr. Abdulaziz Bokeris obtained his Honours Degrees of Bachelor of Medicine, Bachelor of Surgery, and Bachelor of the Art of Obstetrics in 2017 from the Royal College of Surgeons in Ireland. Dr. Bokeris is expected to complete his residency training with Dalhousie University in 2025.



### **AYOUB DAKSON** MBChB (Fellow)

**MD University of Manchester 2011 | Manchester, England**

Dr. Ayoub Dakson obtained his MBChB from the University of Manchester, England with a Master's in Medical Research (Merits). Prior to this, he completed a BSc (Honours) in Medical Sciences at St. Andrew's University. Dr. Dakson completed his residency training in 2018 and a Spine Fellowship with the Dalhousie Spine Program in 2019.



### **CARLOS RESTREPO RUBIO** MD (Fellow)

**MD Universidad el Bosque 2006 | Bogota, Colombia**

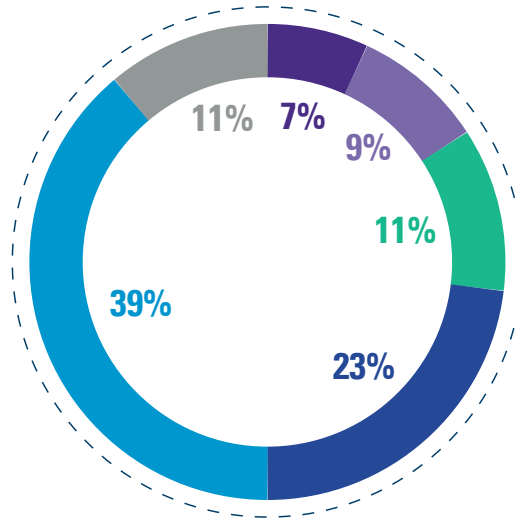
Dr. Restrepo Rubio obtained his Doctor of Medicine from Universidad el Bosque in 2006 and completed his Neurosurgery Residency at Universidad el Bosque in Bogota, Colombia in 2014. He completed a Peripheral Nerve Surgery fellowship at the Mayo Clinic in Rochester, Maine in 2015 and a Deep Brain Stimulation Fellowship at the Mayo Clinic in 2016. He began a Neuromodulation Fellowship with Neurosurgery at Dalhousie in 2019.

# Clinical Activities

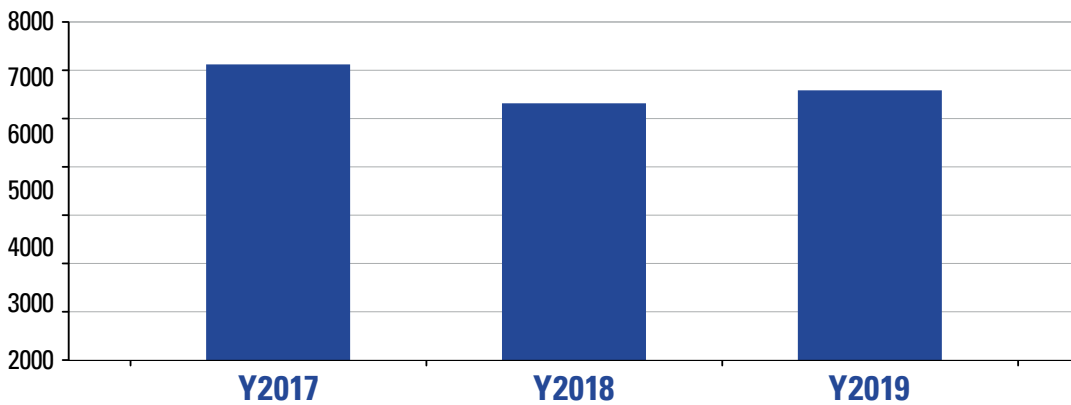


## Neurosurgical Procedures

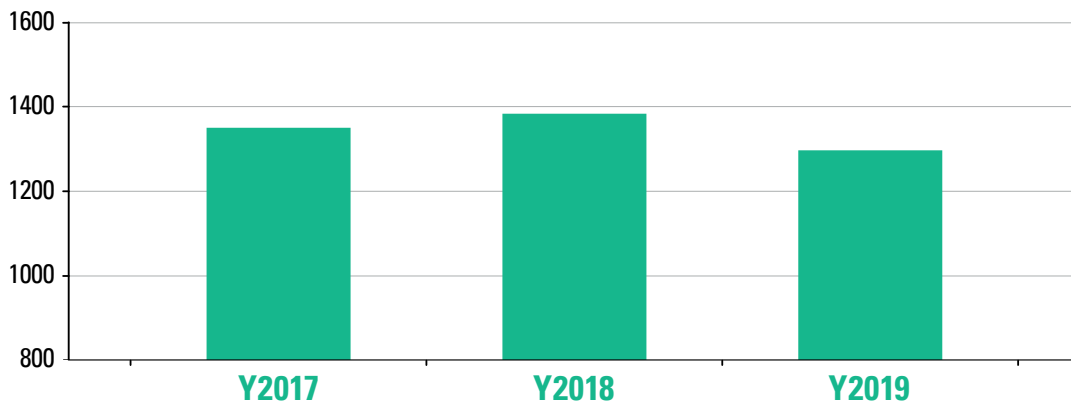
- Cerebrovascular
- Pediatric
- Functional
- Cranial Procedures
- Spine
- Other



## Ambulatory Care Visits



## Neurological Procedures



# Academic Neuroscience Program and Neurosurgery Inpatient Unit 7.3

**Director:** Randi Monroe  
**Health Services Manager:** Fran Kelloway,  
 Manager 7.3 Nursing Team  
**Health Services Manager:** Joanne Comeau,  
 Manager 7.3 Interdisciplinary Team

2019 was again a busy year for the 7.3 Inpatient Neurosurgery Unit, filled with change and rejuvenation as well as some goodbyes. The main goal this year was to settle into our new staffing model and mentor staff to ensure our patients and families receive the excellence in neurosurgical care that we strive to provide. Our resource nurses played a huge and beneficial role in this mentoring process.

The new model of care for the Neuroscience Alliance team was implemented in 2017 based on the nursing and allied health Professional Practice review in 2016. A further review in 2018 was required due to changes in the RN/LPN model of care based on patient acuity, high patient turnover rate, and RN staffing, with more than half of our RNs having less than one year of nursing experience. In October of 2018, we moved to an all RN model with Care Team Assistants (CTA) to support this new nursing model. 2019 was our first full year with this model implemented, we have received positive feedback from staff, patients, and families – Patients are receiving attentive and thorough care.



Randi Monroe



Fran Kelloway

Our RNs appreciate the help of the CTAs, reducing their physical patient load, allow them time to focus on care planning, patient education, and documentation. CTAs are being used to their full scope of practice with some additions of unit specific competencies.

Leadership positions on 7.3:

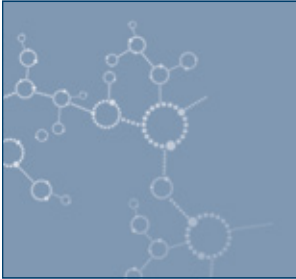
- Charge Nurse: Dayna El-Hassan finished her term in charge in January and Renee Boudreau took over. Megan Lambert continued as Renee's co-charge.
- Resource Nurse: Laura Croft finished her role in resource and Jaime Brewer and Dayna El-Hassan continued on as co-resource nurses.
- Neurosciences Clinical Nurse Educator: Melissa Brinson
- Brain Tumor Nurse: Samantha Warren

The inter-disciplinary team on 7.3 has been stable throughout the year, allowing for regular recreation therapy staffing and prioritized Saturday physiotherapy services. The team continues to work collaboratively with 7.4 Neurology colleagues to ensure coverage needs and high-priority care needs are addressed. Staff have adapted to responding to the needs within our neurosciences group rather than a unit-specific approach.

Other highlights and initiatives from 7.3 in 2019:

- The Division of Neurosurgery was highlighted in the Winter edition of the Nova Scotia Health Authority's Central Zone Patient Flow/Utilization Management Update. Two electronic 40" touchscreens display patient flow status on Neurosurgery's 7.3 unit. Nursing staff will have timely individual access to view and update current patient information including reasons for stay, plan of care and discharge notes. The electronic boards will also assist with resource planning and identifying potential barriers to patient care. Thanks to all involved in this initiative!
- The Masimo system was installed and all RNs have received training. This system allows the unit to accommodate OSA patients post-operatively on the unit rather than in the Intermediate Care Unit (IMCU).
- A multidisciplinary team (clinic, OR, PACU, inpatient unit) worked together to meet with Enhanced Recovery After Surgery (ERAS) specialist, Wain Wright, to discuss implementation of ERAS protocol for our elective spine surgeries. Research, data collection and planning is ongoing.
- A new bladder scanner was purchased for the unit.
- Several new automatic vital machines were purchased.

# Clinical/Research Staff



**LORELEI AUDAS**  
RN, BScN, CCRP  
Program Coordinator:  
Neurotrauma/Simulation



**SUSAN DOBBIN**  
RN  
Neurosurgery Clinic



**NICKY AYLES**  
RN  
Neurosurgery Clinic



**LYNNE FENERTY**  
RN, BN, DO(MP)  
Neurotrauma/Injury Prevention



**ASHLEIGH BENTON**  
Research Coordinator:  
Neurosurgery Spine



**RYAN GREENE**  
RN, BN, DO(MP)  
Research Coordinator:  
Neurosurgery Spine



**CORALEA CAREY**  
Research Assistant:  
Neurotrauma/Injury Prevention



**ANDREA L.O. HEBB**  
MSc., PhD, RN  
Clinical/Research Coordinator:  
Brain Tumour  
Maritime Lateral Skull Base  
Neuropituitary

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**RON HILL**  
Technology Coordinator



**NELOFAR KURESHI**  
MD, MHI  
Research Associate:  
Neurotrauma/Simulation/  
Neurosurgery Spine



**MURRAY HONG**  
PhD  
Neurosurgery OR/  
Technical Specialist



**ANGELA MEAGHER**  
RN, NP  
Neurosurgery Spine



**JUDITH JARRETT**  
RN, CCRP  
Program Coordinator:  
Cerebrovascular



**CAROLE-ANN MILLER**  
RN, NP  
Cerebrovascular



**LISA JULIEN**  
RB, BScN, CCRP  
Program Team Lead:  
Neurosurgery Spine



**SHIRLEY MACLEOD**  
Research Assistant:  
Neurosurgery Spine

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## Clinical/Research Staff (cont'd)



**SARANYAN PILLAI**

PhD

**Research Associate:  
Neurosurgery Spine**



**SAMANTHA WARREN**

**Brain Tumour Liaison Nurse**



**CHRISTINE POTVIN**

RN

**Program Coordinator:  
Neuromodulation**



**RACHEL WOODMAN**

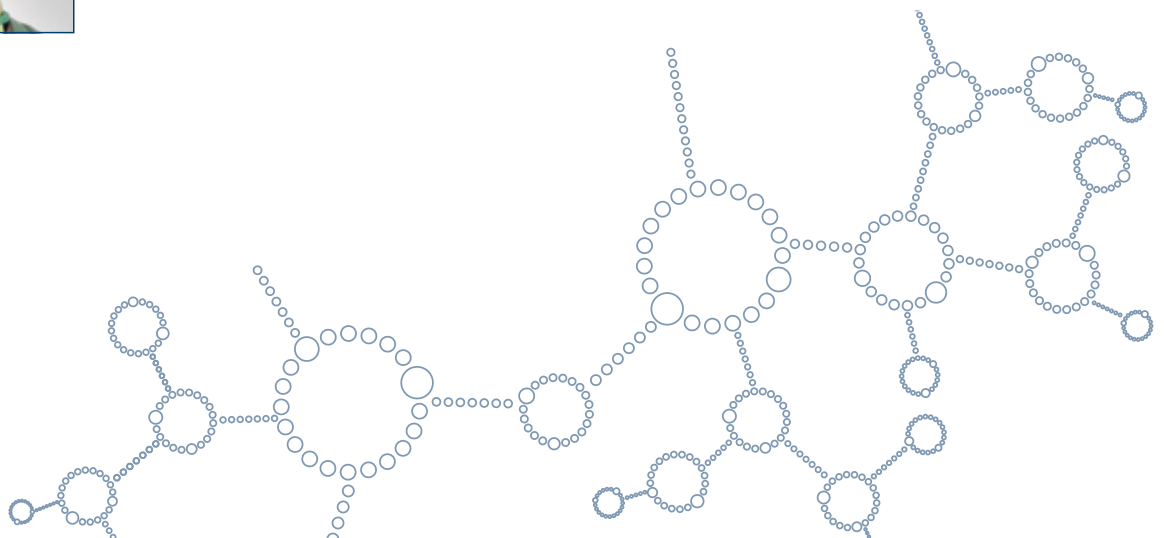
**Neurosurgery Clinic Aide**



**SUSAN RAHEY**

BSc, RET, RT(EMG)

**Program Coordinator:  
Epilepsy**



# Administrative Staff



**DEBBIE AMIRAULT**

Assistant to  
Dr. Sean Barry



**MELISSA COOK**

Assistant to  
Dr. Sean Christie



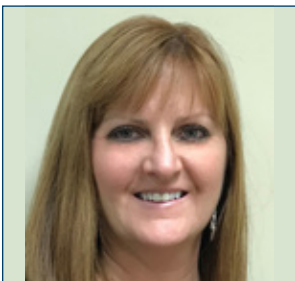
**KATHARINE  
ANDERSON**

Assistant to  
Dr. Gwynedd Pickett



**PAM SLAUENWHITE**

Assistant to  
Dr. Lutz Weise



**LORRAINE BELL-HILL**

Administrator  
Division of Neurosurgery



**EMMA GILLESPIE-  
FRASER**

Assistant to  
Dr. Adrienne Weeks



**CATHY CARON**

Assistant to  
Dr. Daniel McNeely



**DIANE JARDINE**

Assistant to  
Dr. David Clarke

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## Administrative Staff (cont'd)



**MAUREEN KAY**

Assistant to  
Dr. Jacob Alant  
Neurosurgery Spine  
Referral Coordinator



**ELIZABETH SCOTT**

Assistant to  
Dr. Adrienne Weeks



**KELLY MARTIN**

Executive Assistant  
to Dr. David Clarke



**CHRISSY SHAY**

Assistant to  
Dr. Simon Walling



**HEATHER  
MUNROE**

Residency Program  
Administrator

## Neurosurgery OR Nurses

**JENNY BARNES SMITH  
SAM CAMERON  
REBECCA TOMPKINS  
AMANDA GEORGE  
JEN HOYT  
ANNE JURCINA  
DONNA MACQUEEN  
DENYNE PARK  
JESSICA TAYLOR  
AMANDA WOODS**





PENTERO

# Neurosurgery Spine Program



**BACK (LEFT TO RIGHT):** Dr. S. Barry, L. Julien, A. Benton, Dr. J. Alant, M. Cook, Dr. S. Christie  
**FRONT (LEFT TO RIGHT):** S. Moore, M. Kay, D. Amirault

**Director:** Dr. Sean Christie  
**Program Team Lead:** Lisa Julien  
**Research Coordinator:** Ryan Greene  
**Research Associates:** Nelofar Kureshi and Saranyan Pillai  
**Research Assistants:** Shirley MacLeod

The Neurosurgery Spine Program provides comprehensive care to patients with spinal disorders and spinal cord injuries.

## Accomplishments

Within the spine research program, we were successfully awarded two NSHA Research fund grants

- Occult bacterial discitis and Modic change in patients receiving surgical therapy for lumbar disc herniation
- Plasma melatonin levels after acute traumatic spinal cord injury in individuals with complete and incomplete cervical and thoracic spinal cord injury

- We were also successful with a TRIC Level 1 grant for “Implementation of an Enhanced Recovery after Surgery (ERAS) Protocol for Spine Surgery at the QEII”. We were very fortunate that Dr. Tom Wainwright from Bournemouth, England came to Halifax Oct 8-11, 2019 to share his experience and expertise with ERAS and assist us with our working groups.
- The Atlantic Canada Spine meeting was held for the 11th consecutive year as a regional CME spine-focused event. The topic of focus was “General Topics in Spine Surgery.” Dr. Chris Bailey was this year’s invited guest speaker. We thank Medtronic Canada and Anchor Orthopedics for their continued support.

## Research

Spine program research projects include investigator-initiated and pharmaceutical-driven studies, as well as multi-center national and international studies. Below is the list of projects we are conducting.

**Multi- Centre Studies:**

**Vertex:** A Phase 2b/3, Double-blind, Randomized, Placebo-Controlled, Multi-Center Study to Assess the Efficacy and Safety of VX-210 in Subjects with Acute Traumatic Cervical Spinal Cord Injury. This study is investigating the safety and effects of VX-210 in patients with acute traumatic cervical spinal cord injury. VX-210 is a protein derivative of C3 transferase that inhibits Rho in a dose-dependent manner. It is combined with a fibrin sealant and directly applied onto the dura mater of the spinal cord at or near the site of injury during decompression/stabilization surgery within 72hrs after initial injury. We enrolled two patients. (Feb 2017- Feb 2019)

- The Canadian Multi-Center Cerebrospinal Fluid Pressure Monitoring and Biomarker (CAMPER) study – a national multi-center clinical trial examining Mean Arterial Pressure in patients with acute SCI. Cerebrospinal fluid samples collected as part of this study will be used to validate a series of biochemical markers correlating with injury severity and predicting neurologic outcome. We are pleased to be participants in the Biomarkers for Crossing the Translational Divide in Acute Spinal Cord Injury project, led by Dr. Brian Kwon's team in Vancouver, which was awarded \$3 million dollars through the Brain Canada MIRI competition. We enrolled 15 patients into this project. (March 2012 - June 2019).
- This year marks our 12th year of enrollment in the Rick Hansen Spinal Cord Injury Registry (RHSCIR), a national registry of patients with traumatic spinal cord injury (SCI). To date 255 patients have been included and we continue to collect community follow-up questionnaires every 1, 2, 5, 10, 15... years.
- The Canadian Spine Society (CSS) Registry is a national health data registry that tracks outcome measures of the surgical and non-surgical treatment of specific spinal conditions. We are currently in our 6th year of enrollment for this registry. The spine patient populations that are offered participation at our site are surgically managed for the following procedures/indications:
  - Cervical Arthroplasty
  - Cervical Myelopathy/Myeloradiculopathy
  - Lumbar Spondylolisthesis.

Currently 227 patients have been included, 13 in 2019. Within this registry, patients may also be eligible for three sub-studies:

1. Management and Outcome of Cervical Spondylotic Myelopathy – A Standardized Clinical Assessment and Management Plan
2. Surgical Treatment of Degenerative Spondylolisthesis: A Standardized clinical assessment and management plan (SCAMPS) Canadian Spine Society (CSS) multi-center prospective cohort study
3. Decompression Alone vs. Decompression and Instrumented Fusion for the Management of Lumbar Spinal Stenosis Associated with Stable Degenerative Spondylolisthesis: A Pragmatic Randomized Clinical Pilot Trial

**Ongoing Local Studies:**

**Frailty Index in Spinal Cord Injury Patients:** The assessment of frailty may be an important determinant in the appropriate management of older SCI patients. A series of standard laboratory values and clinical data have been previously used to determine a frailty index, which has been linked to clinical outcomes in the elderly. This project will investigate whether the frailty index is associated with in-hospital mortality in SCI patients.

- Attitudes of Canadian Spine Surgeons towards Medical Assistance in Dying (MAID): A national survey was conducted to determine the level of support among Canadian spine surgeons for MAID. This project is pending publication.
- Canadian neurosurgeons' views on medical assistance in dying (MAID): a cross-sectional survey of Canadian Neurosurgical Society (CNSS) members was conducted and published in May 2019 in BMJ Journal of Medical Ethics
- Modic changes in Chronic Lower Back Pain Patients: A retrospective chart and radiological review has been completed to determine whether patients with modic changes have poorer surgical outcomes than those without these imaging features. This project has been submitted for publication.
- A Study of Titanium Ion Concentrations in the Whole Blood of Patients Following Metal-on-Metal Cervical Arthroplasty: This project is designed to investigate the level of titanium metal ions in a patient's whole blood. Patients who are invited to participate have previously undergone, or are scheduled to undergo cervical arthroplasty surgery using the Medtronic Prestige LP prosthesis or are scheduled to undergo a single level anterior cervical discectomy and fusion with the Atlantis Vision Elite plate. Patients will be monitored for 10 years post-op; all serum samples are sent to a central facility for analysis. If patient titanium levels are reported to be > 100 pbb there may be health concerns. To date 27 out of 40 subjects have been enrolled.
- A Data-Driven e-Health Platform for Informed and Evidence-based Decision Making to Triage Spinal Surgeries. In collaboration with Dr. Raza Abidi (Faculty of Computer Science, Dalhousie University), we have been awarded funding from CIHR Personalized Health Catalyst Grant to conduct this project.
- As part of his RIM project, Ege Babadagli completed the following project: Investigating the Determinants of the Assessment Score for Predicting Surgical Patient Outcome through the Application of Machine Learning Methods. The goal of this study is to answer the following research question: How may the clinical, pathological, radiological criteria constituting the Assessment Score be modified to improve the capability of the scoring system to predict therapeutic outcomes for patients who are offered surgical intervention?
- Can we better predict long-term success of permanent spinal cord stimulators? We were successful in receiving a grant from the NSHARF and currently we have three patients enrolled out of 25.

# Neurosurgery Spine Program (cont'd)

- Occult bacterial discitis and Modic change in patients receiving surgical therapy for lumbar disc herniation. We were successful in receiving a grant from NSHARF and we currently have four patients enrolled out of 78.
- Plasma melatonin levels after acute traumatic spinal cord injury in individuals with complete and incomplete cervical and thoracic spinal cord injury. We were successful in receiving a grant from NSHARF and a QEII Foundation donation. Screening for this started in November 2019.
- There is significant overuse of Lumbar spine MRI scans in Canadian practice, with over half of MRI requests being inappropriate or uncertain if the scan was needed. We are conducting a retrospective study to assess the appropriateness of ordering Lumbar spine MRIs in Nova Scotia. We are collaborating with the Department of Diagnostic Imaging.
- Epidemiology and Outcomes of Neck Pain after Surgery for Cervical Radiculopathy. We conducted a multi-center, ambispective review of consecutive patients who underwent surgery for cervical radiculopathy that were enrolled by The Canadian Spine Outcomes Research Network (CSORN). The study highlights a significant improvement in 12-month post operative PROMs, including NP, across various commonly employed surgical procedures for the treatment of cervical radiculopathy. These studies offer insight into the utility of these procedures for the reduction of axial neck pain and may allow clinicians to more accurately prognosticate patients' convalescence and aid in surgical decision-making. Publication is pending.

## Publications

Glennie RA, **Barry SP**, **Alant J**, **Christie S**, Oxner WM. Will cost transparency in the operating theatre cause surgeons to change their practice? *J Clin Neurosci*, 60:1-6, 2019.

**Althagafi A**, Ekong C, Wheelock BW, Moulton R, Gorman P, Reddy K, **Christie S**, Fleetwood I, **Barry S**. Canadian neurosurgeons' views on medical assistance in dying (MAID): a cross-sectional survey of Canadian Neurosurgical Society (CNSS) members. *J Med Ethics*, 45(5):309-313, 2019.

Squair, Belanger, Tsang, Ritchie, Mac-Thiong, Parent, Christie, Bailey, Dhall, Charest-Morin, Street, Ailon, Paquette, Dea, Fisher, Dvorak, West, Kwon. Empirical targets for acute hemodynamic management of individuals with spinal cord injury. *Neurology* 93(12) 1205-1211, 2019.

Bond M, McIntosh G, Fisher C, Jacobs B, Johnson M, Bailey CS, **Christie S**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Wilson J, Manson N, Hall H, Thomas K, Rampersaud YR, Dea N; Canadian Spine Outcomes and Research Network (CSORN) group. Treatment of Mild Cervical Myelopathy: Factors Associated With Decision for Surgical Intervention. *Spine (Phila Pa 1976)*, 44(22):1606-1612, 2019.

Sharifi B, McIntosh G, Fisher C, Jacobs WB, Johnson M, Bailey CS, **Christie S**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Manson N, Hall H, Thomas KC, Rampersaud YR, Dea N. Consultation and Surgical Wait Times in Cervical Spondylotic Myelopathy. *Can J Neurol Sci*, 46(4):430-435, 2019.

Srinivas S, Paquet J, Bailey C, Nataraj A, Stratton A, Johnson M, Salo P, **Christie S**, Fisher C, Hall H, Manson N, Rampersaud YR, Thomas K, McIntosh G, Dea N. Effect of spinal decompression on back pain in lumbar spinal stenosis: a Canadian Spine Outcomes Research Network (CSORN) study. *Spine J*, 19(6):1001-1008, 2019.

Tigchelaar S, Gupta R, Shannon CP, Streijger F, Sinha S, Flibotte S, Rizzuto MA, Street J, Paquette S, Ailon T, Charest-Morin R, Dea N, Fisher C, Dvorak MF, Dhall S, Mac-Thiong JM, Parent S, Bailey C, **Christie S**, Van Keuren-Jensen K, Nislow C, Kwon BK. MicroRNA Biomarkers in Cerebrospinal Fluid and Serum Reflect Injury Severity in Human Acute Traumatic Spinal Cord Injury. *J Neurotrauma*, 36(15):2358-2371, 2019.

Ailon T, Tee J, Manson N, Hall H, Thomas K, Rampersaud YR, Yee A, Dea N, Glennie A, Bailey C, **Christie S**, Weber MH, Nataraj A, Paquet J, Johnson M, Norton J, Ahn H, McIntosh G, Fisher CG. Patient-reported outcomes following surgery for degenerative spondylolisthesis: comparison of a universal and multitier health care system. *Spine J*, 19(1):24-33, 2019.

## Case Report

Alant, Jacob, and Leck, Erica. "Case 24 \*Review & Answer." *Spinal Columns* 19.1 (2019): 33-37.

## Abstracts

Rates and predictors of return to work after surgery for cervical spondylotic myelopathy: analysis from the Canadian Spine Outcomes and Research Network. Jefferson Wilson, Jetan Badhiwala, Bradley Jacobs, Michael Johnson, Christopher Bailey, **Sean Christie**, Raphaelae Charest-Morin, Jérôme Paquet, Andrew Nataraj, David Cadotte, Neil Manson, Hamilton Hall, Ken Thomas, Raja Rampersaud, Greg McIntosh, Charles Fisher, Nicolas Dea. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Minimum clinically important difference in patient reported outcomes for cervical spondylotic myelopathy: an analysis from the Canadian Spine Outcomes and Research Network. Jetan Badhiwala<sup>1</sup>, Jefferson Wilson, Bradley Jacobs, Michael Johnson, Christopher Bailey, **Sean Christie**, Raphaelae Charest-Morin, Jérôme Paquet, Andrew Nataraj, David Cadotte, Neil Manson, Hamilton Hall, Ken Thomas, Raja Rampersaud, Greg McIntosh, Charles Fisher, Nicolas Dea. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Importance of sagittal alignment in cervical spondylotic myelopathy: an observational study from the Canadian Spine Outcomes and Research Network. Nathan Evaniew, Raphaële Charest-Morin, W. Bradley Jacobs, Michael Johnson, Chris Bailey, **Sean Christie**, Jérôme Paquet, Andrew Nataraj, David W. Cadotte, Jefferson R. Wilson, Neil Manson, Hamilton Hall, Ken Thomas, Y. Raja Rampersaud, Greg McIntosh, Charles G. Fisher, Nicolas Dea. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Are there gender-based differences in outcomes for elective lumbar spine surgery in Canada? Henry Ahn, Abel Davtyan, Chris Bailey, **Sean Christie**, Eugene Wai, Michael Weber, Ken Thomas, Albert Yee, Nicholas Dea, Charles Fisher, Alex Soroceanu, Jerome Paquet, Philippe Phan, Raja Rampersaud, Peter Jarzem, Duncan Cushnie. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Predicting mortality following traumatic cervical spinal cord injury in the elderly. Tom Inglis, Marcel Dvorak, Daniel Banaszek, Nathan Evaniew, Dilnur Kurban, Nader Fallah, Vanessa Noonan, Christopher Bailey, **Sean Christie**, Brian Drew, Michael Fehlings, Joel Finkelstein, Charles Fisher, Daryl Fourney, Andrea Townson, Eve Tsai, Zeina Waheed, Brian Kwon, RHSCIR Network. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Does surgical intervention alter outcome in elderly patients with traumatic spinal cord injury? Tom Inglis, Marcel Dvorak, Daniel Banaszek, Nathan Evaniew, Dilnur Kurban, Nader Fallah, Vanessa Noonan, Carly Rivers, Christopher Bailey, **Sean Christie**, Brian Drew, Michael Fehlings, Joel Finkelstein, Charles Fisher, Daryl Fourney, Andrea Townson, Eve Tsai, Zeina Waheed, Brian Kwon, RHSCIR Network. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

The opinion of Canadian spine surgeons on medical assistance in dying (MAiD): a cross-sectional survey of Canadian Spine Society (CSS) members. **Erika Leck**, **Sean Barry**, Chris Ekong, Brian Wheelock, Richard Moulton, Peter Gorman, Kesh Reddy, **Sean Christie**, Ian Fleetwood. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Neck and arm pain after surgery for cervical myelopathy: outcomes and predictors of improvement. **Ayoub Dakson**, **Sean Christie**, Bradley Jacobs, Michael Johnson, Christopher Bailey, Raphaële Charest-Morin, Jérôme Paquet, Andrew Nataraj, David Cadotte, Jeff Wilson, Neil Manson, Hamilton Hall, Ken Thomas, Raja Rampersaud, Greg McIntosh, Charles Fisher, Nicolas Dea. 19th Annual Canadian Spine Society Scientific Conference Feb 27-March 2, 2019 (Toronto, Ontario). Published in Can J Surgery (4 Supplement 1).

Rates and predictors of return to work after surgery for cervical spondylotic myelopathy: analysis from the Canadian Spine Outcomes and Research Network. Jefferson Wilson, Jetan Badhiwala, Bradley Jacobs, Michael Johnson, Christopher Bailey, **Sean Christie**, Raphaelae Charest-Morin, Jérôme Paquet, Andrew Nataraj, David Cadotte, Neil Manson, Hamilton Hall, Ken Thomas, Raja Rampersaud, Greg McIntosh, Charles Fisher, Nicolas Dea. North American Spine Society 34th Annual Meeting-September 25-29, 2019, Chicago, IL. Published in Spine J 19 (9).

Predicting mortality following traumatic cervical spinal cord injury in the elderly. Tom Inglis, Marcel Dvorak, Daniel Banaszek, Nathan Evaniew, Dilnur Kurban, Nader Fallah, Vanessa Noonan, Christopher Bailey, **Sean Christie**, Brian Drew, Michael Fehlings, Joel Finkelstein, Charles Fisher, Daryl Fourney, Andrea Townson, Eve Tsai, Zeina Waheed, Brian Kwon, RHSCIR Network. North American Spine Society 34th Annual Meeting- September 25-29, 2019, Chicago, IL. Published in Spine J 19 (9).

Importance of sagittal alignment in cervical spondylotic myelopathy: an observational study from the Canadian Spine Outcomes and Research Network. Nathan Evaniew, Raphaële Charest-Morin, W. Bradley Jacobs, Michael Johnson, Chris Bailey, **Sean Christie**, Jérôme Paquet, Andrew Nataraj, David W. Cadotte, Jefferson R. Wilson, Neil Manson, Hamilton Hall, Ken Thomas, Y. Raja Rampersaud, Greg McIntosh, Charles G. Fisher, Nicolas Dea. North American Spine Society 34th Annual Meeting-September 25-29, 2019, Chicago, IL. Published in Spine J 19 (9).

# Neurosurgery Spine Program (cont'd)

Factors associated with motor, sensory, bladder and bowel function recovery after traumatic cauda equina injury (TCEI). Najmedden Attabib, Colleen O'Connell, Dilnur Kurban, Carly S. Rivers, Vanessa K. Noonan, Karen Ethans, Heather Flett, Christopher S. Bailey, **Sean D. Christie**, Eve C. Tsai, Julio C. Furlan. North American Spine Society 34th Annual Meeting- September 25-29, 2019, Chicago, IL. Published in Spine J 19 (9).

Neck and arm pain after surgery for cervical myelopathy: outcomes and predictors of improvement. **A Dakson, S Christie**, B Jacobs, M Johnson, C Bailey, R Charest-Morin, J Paquet, A Nataraj, D Cadotte, J Wilson, N Manson, H Hall, K Thomas, R Rampersaud, G McIntosh, C Fisher, N Dea. 54TH Annual Congress of Canadian Neurological Science Federation-Montreal, PQ June 15-19, 2019. Published in Canadian Journal of Neurological Science (46) S1.

The opinion of Canadian spine surgeons on medical assistance in dying (MAiD): a cross-sectional survey of Canadian Spine Society (CSS) members. **Erika Leck, Sean Barry**, Chris Ekong, Brian Wheelock, Richard Moulton, Peter Gorman, Kesh Reddy, **Sean Christie**, Ian Fleetwood. 54TH Annual Congress of Canadian Neurological Science Federation-Montreal, PQ June 15-19, 2019. Published in Canadian Journal of Neurological Science (46) S1.

A nation-wide prospective multi-centre study of external ventricular drainage accuracy, safety and related complications. **A Dakson**, M Kameda-Smith, MD Staudt, P Lavergne, M Eagles, C Elliott, C Iorio-Morin, S Makarenko, **A Althagafi**, CJ Touchette, MK Tso and **S Christie**. 54TH Annual Congress of Canadian Neurological Science Federation-Montreal, PQ June 15-19, 2019. Published in Canadian Journal of Neurological Science (46) S1.

## Posters

**Institute for Healthcare Improvement Conference, Dec 2019 (Orlando, Florida)**. Enhanced Recovery after Surgery (ERAS) for Scheduled Spine Surgery". Jenna Forrester-Smith and Dalhousie Neurosurgery ERAS Program Steering Committee.

## Invited Presentations/Lectures

**Alant, J.** 8th Annual McMaster Neuroscience Day Symposium. May 24, 2019. "Where Nerves Meet the Spine: Should Nerve Injury Classification be updated?"

**Christie, SD.** 11th Atlantic Canada Spine Meeting, Oct 18-20, 2019. "Evidence-based, practical approach to C-Spine clearance"

**Christie, SD.** 11th Atlantic Canada Spine Meeting, Oct 18-20, 2019. "Enhanced recovery after surgery (ERAS)-Spine Specific Protocol"

**Christie, SD.** 11th Atlantic Canada Spine Meeting, Oct 18-20, 2019. "Should we be thinking about cervical balance?"

## Funding/Grants

Rick Hansen Institute. Canadian Multi-Centre Cerebrospinal Fluid Pressure Monitoring and Biomarker Study. \$323,280 (2012-2019)

Rick Hansen Institute. Rick Hansen Spinal Cord Injury Registry. \$562,000 (2008-2019)

Medtronic of Canada, Ltd. Unrestricted Research Grant. \$40,000 (2019)

Vertex Pharmaceutical Inc. \$78,830 (2017-2019)

CIHR Personalized Health Catalyst Grant: \$199,408 (2017-2019)

NSHA Research Fund Grant (Fitbit study): \$25,000 (2018-2020)

NSHA Research Fund Grant (Melatonin Study): \$25,000 (2019-2021)

QE II Foundation (Donor) (Melatonin Study): \$50,000 (2019-2020)

NSHA- Research Fund Grant (Modic LDH); \$25,000 (2019-2021)

CIHR- PROTEST Trial: \$742,000 (2018-2023)

University Health Network (RTC-DA vs. DF study) \$10,000 (2017-2019)

## Team Members

- Dr. Sean Christie, Neurosurgeon
- Dr. Jacob Alant, Neurosurgeon
- Dr. Sean Barry, Neurosurgeon
- Dr Lutz Weise, Neurosurgeon
- Nelofar Kureshi, Research Associate
- Dr. Saranyan Pillai, Research Associate
- Lisa Julien, Research Coordinator, Program Team Lead
- Ashleigh Benton, Research Coordinator
- Ryan Greene, Research Coordinator
- Murray Hong, Neurosurgery OR
- Debbie Amirault, Administrative Support
- Melissa Cook, Administrative Support
- Pam Doucette, Administrative Support
- Maureen Kay, Administrative Support

## Team Collaborators

- Dr. William Oxner, Orthopedic Surgery
- Dr. Andrew Glennie, Orthopedic Surgery
- Dr. Cynthia Dunning Zwicker, Research Manager, Orthopedic Spine Service
- Dr. Sonja McVeigh, NS Rehabilitation Centre
- Dr. Kate Montgomery, NS Rehabilitation Centre
- Dr. Christine Short, NS Rehabilitation Centre
- Dr. Matthias Schmidt, Diagnostic Imaging
- Dr Jason Leblanc, Microbiology
- Dr Glenn Patriquin, Microbiology
- Dr. Ian Beauprie, Pain Management Unit
- Dr. Karim Mukhida, Pain Management Unit
- Dr. Ken Rockwood, Geriatric Medicine
- Dr. Scott Kehler, Geriatric Medicine

# Neuromodulation Program

**Director:** Dr. Lutz Weise

**Program Coordinator:** Christine Potvin

**Program RN:** Nichola Ayles

Our neuromodulation program provides neuromodulation care to the people of Atlantic Canada (population ~2.3M). The program focuses on improvements to quality of life primarily for people suffering from movement disorders, complex pain syndromes, and spasticity. The patient population includes patients with implantable neurostimulators for deep brain (DBS), cortical, spinal cord (SCS), and peripheral stimulation. We currently follow 240 people with stimulators for movement disorders, and 237 with stimulators for pain.

In 2019, the program welcomed Dr. Carlos Restrepo Rubio who will be completing his fellowship until summer 2021. His knowledge and experience will further improve the program.

Deep Brain Stimulation (DBS) clinics with several Neurologists provide a comprehensive assessment of potential DBS candidates. In addition, there are DBS rounds in which patients are reviewed by the team and treatment options discussed. In our complex pain clinic, patients are seen and evaluated by both a neurosurgeon and a complex pain anesthesiologist and a treatment plan is developed.

With their consent, patient information including quality of life surveys and intra-operative microelectrode recording data are entered into a database for analysis.

Various research activities are in progress, including electrophysiological and tractography studies in patients undergoing Deep Brain Stimulation. Ethics approval was obtained on "Correlation of tractography and motor evoked potentials in deep brain stimulation" and we enrolled 41 patients thus far. Further projects include the evaluation of the impact of disease lateralization on imaging characteristics such as tractography. We are also participating in device research registry in which we collect several quality of life questionnaires, as well as pertinent information relating to the device.

Oral Presentations were given at local, national and international meetings:

- Operative Therapy in Functional Neurosurgery. Goethe University, Frankfurt, Germany, February 28, 2019.
- Exploring Canada-Israel collaboration opportunities in Deep Brain Navigation: Awake vs asleep DBS-from microelectrode recording to evoked potentials. Embassy of Canada to Israel. Tel Aviv, Israel, March 6, 2019.
- Deep Brain Stimulation. Combined Psych/Neurology Rounds. Halifax, NS, April 24, 2019.

- Influence of Disease Lateralization in Parkinson's on Tractography and Electrophysiology Findings. Canadian Neuromodulation Society Meeting. Iqaluit, Nunavut, July 1, 2019.
- DBS in the Management of Parkinson's Disease and other Movement Disorders. Neurology Update. Sydney, NS, September 20, 2019.
- Spinal Cord Stimulation: Predictors of Success. Atlantic Canada Spine Meeting. Wallace, NS, October 19, 2019.

## Team Members:

- Dr. Lutz Weise, Neurosurgeon
- Dr. Sean Christie, Neurosurgeon
- Dr. Carlos Restrepo, Neurosurgery Fellow
- Dr. Ian Beauprie, Anesthesiologist/Pain Specialist
- Christine Potvin, Program Coordinator
- Nichola Ayles, Program RN
- Ron Hill, Neurosurgery Technology Coordinator
- Murray Hong, Neurosurgery OR/Technical Specialist
- Susan Morris, Neurophysiologist, Intraoperative Neurophysiological Monitoring
- Dr. John Fisk, Neuropsychologist
- Dr. Mark Rubens, Psychiatry
- Dr. David King, Neurologist (movement disorders)
- Dr. Kerry Schoffer, Neurologist (movement disorders)
- Dr. Roger McKelvey, Neurologist (movement disorders)
- Dr. Heather Rigby, Neurologist (movement disorders)
- Pam Slauenwhite, Administrative Assistant

## Off Site Collaborators:

- Dr Renju Kuriakose, Neurologist, NB
- Dr Kyna Squarey, Neurologist, NL



**FRONT (L TO R):** N. Ayles, C. Potvin, R. Hill, Dr. L. Weise, P. Slauenwhite

# Halifax Surgical Epilepsy Program

**Co-Chairs:** Drs. David Clarke and Mark Sadler  
**Program Coordinator:** Susan Rahey

Epilepsy patients referred from Nova Scotia, Prince Edward Island, New Brunswick and Newfoundland and Labrador have access to a comprehensive service supported by the Divisions of Neurology and Neurosurgery, including:

- specialty outpatient clinics
- Neuropsychologist, Neuropsychiatrist, Psychometrist and Social Worker
- a four-bed inpatient Epilepsy Monitoring Unit (Phase I and Phase II studies)
- access to a variety of structural and functional imaging techniques (including 3T MRI, fMRI, PET and MEG)
- surgical options including depth electrode implantation (stereo EEG (SEEG), and/or subdural electrodes), cortical resection, lesionectomy, corpus callosotomy and vagus nerve stimulator implantation

## Program Goals

- To provide access to the latest medications and surgical techniques in the setting of a comprehensive epilepsy program to people in Nova Scotia, Prince Edward Island, New Brunswick and selected patients from Newfoundland and Labrador.
- To continue to seek out innovative ways to continue to improve all aspects of service.

## Accomplishments

2019 saw a continuation of the service increases resulting from the expansion of the Epilepsy Monitoring Unit. Service was enhanced by the addition of Fellows in both Neurology (epilepsy) and Neurosurgery. As well, we were fortunate to have a Neuropsychiatrist join the team in 2019.

- There were 79 admissions to the Epilepsy Monitoring Unit (EMU). We continue to experience longer duration admissions than in previous years.
- Included in the EMU admission total were 19 admissions for SEEG invasive recording (Phase II studies).

- Therapeutic epilepsy surgical procedures were performed on 18 patients.
- Only one patient required etomidate speech and memory testing this year.
- More than 1400 patient visits were registered in the various outpatient epilepsy clinics.
- Dr. R. Mark Sadler was awarded the Canadian League against Epilepsy Clinical Practice and Advocacy Award for 2019.
- The return of one EEG Technologist from maternity leave during the month of August returned technologist staffing to capacity. Andrew Kennedy and Debbie MacDougall successfully challenged the Canadian Board of Registration of EEG technologists Examinations.
- Dr. Mark Rubens, Psychiatry, joined our team
- Dr. Stephanie Woodroffe and Dr. Ben Whatley successfully completed the Canadian Society of Clinical Neurophysiologists EEG Examination in June 2019
- Dr. Ben Whatley completed his first year of a two year Fellowship in Epilepsy and Neurophysiology at the National Hospital for Neurology and Neurosurgery, Queen Square, in London, England.
- EMU patients continue to have support and encouragement to one another via their own Facebook page.
- Weekly epilepsy case conferences continue to be widely attended by team members along with colleagues from the IWK Health Centre, Maritime Medical Genetics and the MEG laboratory. Discussion of EMU cases are the focus, with rare opportunity for outpatient cases or guest speakers.
- Educational opportunities were made available to community groups, nursing, technical and medical students and staff and to colleagues attending various local, national and international meetings. The results of research projects were presented at national and international professional meetings.
- Celebration of Purple Day for Epilepsy Awareness on March 26th continued to be a high point of our year, with many staff and patients volunteering and attending the display for purple cupcakes and education.
- We continue to benefit from the enthusiasm and commitment brought to the program by Fellows and Residents assigned to the Epilepsy Program.



## Research

Team members are engaged in clinical and bench research, including drug trials, neuropsychological profile development, and brain stimulation and imaging techniques/modalities.

## Future Directions

Program Members continue their commitment to the betterment of epilepsy care in our region and beyond. Technical advances within the epilepsy surgery program continue.

## Team Members

- Dr. Mark Sadler, Neurologist
- Dr. David Clarke, Neurosurgeon
- Dr. Dan McNeely, Neurosurgeon
- Dr. Kristin Ikeda, Neurologist
- Dr. Stephanie Woodroffe, Neurologist
- Dr. Carlos Restrepo, Neurosurgery Fellow
- Dr. Yousef Al-Najjar, Neurology Fellow
- Susan Rahey, Neurology, Program Coordinator
- Dr. Antonina Omisade, Neuropsychologist
- Dawnette Benedict-Thomas, Psychometrist
- Dr. Matthias Schmidt, Neuroradiologist
- Dr. Mark Rubens, Psychiatry
- Karen Legg, Neurology, Nurse Practitioner

## Team Members (cont'd)

- Michael Whitehead, EEG Technologist
- Philip Godwin, EEG Technologist
- Teona Bjork, EEG Technologist
- Dadel Gayala, EEG Technologist
- Debbie MacDougall, EEG Technologist
- Andrew Kennedy, EEG Technologist
- Heather Smith, Social Worker
- Dr. David Skidmore, Genetics
- Maher Quraan, MEG unit
- Ron Hill, Technology Coordinator
- Murray Hong, Neurosurgery OR Technical Specialist
- Diane Jardine, Administrative Assistant
- Cathy Caron, Administrative Assistant

## Team Collaborators

- Neuropathology
- Neuroscience and Perioperative Staff
- Biomedical Translational Imaging Centre Staff (BIOTIC)
- Health Services Managers
- Biomedical Engineering
- Sterile Processing
- EMU/7.3 Inpatient Unit



**BACK (LEFT TO RIGHT):** Dr. J. Dawe, A. Kennedy, Dr. M. Sadler, Dr. D. Clarke, K. Legg, Dr. K. Ikeda  
**FRONT (LEFT TO RIGHT):** D. MacDougall, S. Rahey, Dr. A. Omisade, Dr. S. Woodroffe

# Neurosurgery Simulation Program

**Director:** Dr. David Clarke

**Technology Coordinator:** Ron Hill

**OR/Technical Specialist:** Murray Hong

**Research Associates:** Nelofar Kureshi and Alena Galilee

Rapid technological advances have enabled simulation training to provide reality-based learning experiences for clinician trainees for our next generation of health care professionals. These customizable simulation platforms provide new and augmented educational programs that focus on required skills traditionally practiced in clinical settings.

Current technology coupled with the needs of advancing health care systems, dictates a strong need for simulation-based learning opportunities for all health care professionals. Simulation supports a cost-effective, accessible and timely system to support well trained practitioners in the delivery of safe health care, with the ultimate goal of improved patient outcomes.

## Mission

- To develop and expand simulation based educational environments for healthcare trainees and inter-professional teams.
- To create a comprehensive surgical simulation program for health care professionals.
- To engage research and knowledge translation of simulation-based education.

## Goal

- Enhance education and skills for health care professionals through simulation based training.

## Research

- Virtual Reality (VR) Training for Medical Device Reprocessing (MDR) staff: this study will evaluate whether PeriopSim™ VR improves efficiency of surgical instrument identification in MDR staff. Participants will be recruited from NSHA Central and Northern zones.
- Simulation Training for Perioperative Orthopedic Nurses using Digital Instrument Recognition (the PONDIR study) – effectiveness and health economic implications. This study seeks to determine the effectiveness of tablet-based simulation training for common orthopedic procedures. Recruitment of participants is underway.

## Publications

Green RS, Erdogan M, Kureshi N, Fenerty L, Thibault-Halman G, **Walling S, Clarke DB**. Association between Hypotension and Mortality in Critically Ill Patients with Severe Traumatic Brain Injury: Experience at a Single Canadian Trauma Center." *Can J Surg*, Vol. 62 (3 Suppl 2), 2019: S27.

## Presentations

**Clarke DB**, Kureshi N, Galilee A, Fenerty L, Thibault-Halman G, Hong M, D'Arcy RCN. Knowledge retention and transfer of simulation-based learning for neurosurgical instruments: A randomized trial of perioperative nurses. International meeting on Simulation in Health Care (IMSH), San Antonio, TX, Jan 2019.

**Clarke DB**, Kureshi N, Galilee A, Hong M, Fenerty L, Thibault-Halman G, D'Arcy RCN. Simulation-based training for burr hole surgery procedure in VR versus iPad applications. American Association of Neurological Surgeons conference abstract presentation, San Diego, California, April 2019.

**Clarke DB**. Simulation-based training for neurosurgical instrument recognition: the Halifax Experience. 54th Annual Congress of Canadian Neurological Sciences Federation, Montreal, Quebec. June 2019.

## Funding

Principal Investigator: Steven D. Beyea  
Co-Investigators: C. Bowen, D. Chiasson, B. Chronik, **David B. Clarke**, A. Friedman, G. Gubitz, J. Rioux, M. Schmidt, J. Shankar, R. Urquhart.  
Optimization & Validation of a Novel Emergency Department Point-of-Care MRI  
Research Nova Scotia Innovation Trust - Innovation Grant and Atlantic Canada Opportunities Agency (ACOA) - Business Development Program (BDP) Award 2018-2019  
**\$1,260,160.04 (RNST) and \$700,000 (ACOA)**

## Team Members

- Dr. David Clarke, Neurosurgeon
- Ron Hill, Neurosurgery Technology Coordinator
- Murray Hong, Neurosurgery OR/Technical Specialist
- Nelofar Kureshi, Research Associate
- Alena Galilee, Research Associate

## Team Collaborators

- Dr. Richard Hurley, Orthopedic Surgery
- Dr. Marcy Saxe-Braithwaite, Perioperative/Surgical Services
- Dr. Ryan D'Arcy, Department of Computing Science, Simon Fraser University
- Denise Lalanne, Biomedical Translational Imaging Centre (BIOTEC)
- Conquer Experience

# Cerebrovascular Program

**Director:** Dr. Gwynedd Pickett

**Coordinator:** Judith Jarrett

The Cerebrovascular Program is a multi-disciplinary program involving neurosurgeons, neuroradiologists, stroke neurologists, nurses and trainees in each of these disciplines. Halifax is the tertiary/quaternary referral centre for the treatment of complex cerebrovascular disorders in Atlantic Canada, with extensive experience in surgical and endovascular management of aneurysms and arteriovenous malformations (AVM), and a stereotactic radiosurgery program for the treatment of patients with AVMs. The cerebrovascular team meets weekly to discuss clinical cases and provide recommendations for an evidence-based approach to patient care.

## Mission

Our team is dedicated to providing world class, innovative, patient-centered care for patients with cerebrovascular disorders.

## Program Goals

- To treat patients with cerebrovascular disorders using the latest technology.
- To advance the knowledge and techniques for the treatment of cerebrovascular disorders through education and research.
- To translate research to evidence based practice.

## Research

We have had an active year in research, participating in several multi-centre studies and local investigator driven studies as listed below. We maintain a number of databases that provide valuable information for local research endeavours.

### Ongoing Multi Centre Studies

- **STAT** – Stenting in the Treatment of large, wide-necked or recurring intracranial Aneurysm Trial. Currently enrolling. Principal Investigator Dr. GE Pickett.
- **ECST-2** – The 2nd European Carotid Surgery Trial: A multicenter randomized controlled open prospective clinical trial with blinded outcome assessment. 22 subjects enrolled, currently in follow-up. (Funding: \$33,547.00). Principal Investigator Dr. GE Pickett.
- **ESCAPE NA1** – A multi-center, randomized, double-blinded, placebo-controlled, parallel group, single-dose design to determine the efficacy and safety of intravenous NA-1 in subjects with acute ischemic stroke undergoing endovascular thrombectomy. Nine subjects enrolled. (Funding: \$144,000.00).
- **REACT** – A prospective, multi-center, double-blind, randomized, placebo-controlled, parallel-group, Phase 3 study to assess the efficacy and safety of clazosentan in preventing clinical deterioration due to delayed cerebral ischemia (DCI), in adult subjects with aneurysmal subarachnoid hemorrhage (aSAH). Currently enrolling, one subject enrolled. (Funding: \$250,000.00). Principal Investigator Dr. GE Pickett.

### Ongoing Local Studies

- Management of ruptured intracranial aneurysms: clinical outcomes over 15 year's post-ISAT. Principal Investigator Dr. GE Pickett.
- 3D Printed Models: can they assist with information transfer and satisfaction when treating intracranial aneurysms? Co-Principal Investigators Dr. AC Weeks, Dr. GE Pickett.
- Evaluation of the Unruptured Intracranial Aneurysm Treatment Score: how does it compare with treatment decisions made by a multi-disciplinary team? Principal Investigator Dr. GE Pickett.
- CT Perfusion Imaging to Predict Vasospasm in Subarachnoid Hemorrhage (Funding: \$25,000.00). Principal Investigator Dr. GE Pickett.

### Events and Accomplishments

- Dr. David Volders and Dr. Adela Cora joined the Department of Radiology in August 2019, performing both diagnostic and interventional neuroradiology, as well as bringing a keen interest in research. We regretfully said farewell to Dr. Laine Green (Neurology) and Dr. Thien Huynh (Neuroradiology) though look forward to ongoing research collaborations.
- Dr. Pickett was President of the 50th Atlantic Clinical Neurosciences Society Conference and Annual General Meeting, Halifax, Nova Scotia, May 24 - 25, 2019.
- The Brain Aneurysm Support Group has been meeting regularly since October 2006. This invaluable resource serves as an opportunity for brain aneurysm patients and families to share information, give and receive emotional support, educate each other, identify needs and access further resources.

# Cerebrovascular Program (cont'd)

## Future Directions

Program members continue to work together to improve the care of patients with cerebrovascular disorders in Nova Scotia and the Atlantic Provinces. The stereotactic radiosurgery (SRS) team has nearly completed the process of acquiring Novalis Certified status. This dedicated accreditation program ensures a high standard in patient safety and treatment quality for SRS. We have been invited to participate in new, externally funded multi-centre studies both nationally and internationally, in the areas of carotid atherosclerotic disease and aneurysm treatment, and eagerly anticipate joining these endeavours.

## Presentations and Invited Lectures

**Pickett GE.** Management of Unruptured Intracranial Aneurysms. Neurology Update XII, Sydney, Nova Scotia, September 2019.

**Pickett GE.** The Future of Vascular Neurosurgery Education in Canada. 54th Congress of the Canadian Neurological Sciences Federation, Montreal, Quebec, June 2019.

**Pickett GE.** Pathophysiology, Diagnosis and Management of Vasospasm. Ottawa Review Course, Ottawa, Ontario, February 2019.

## Posters

Nurmsoo S, Guida A, Wong A, Aviv RI, Demchuk A, Gladstone DJ, Flaherty ML, Dar D, **Gubitz G, Phillips SJ, Weeks A, Pickett GE, Volders D, Vandorpe R, Huynh T.** Training and validation of Deepmedic machine learning tool for automated hematoma segmentation and volume analysis on CT using multicenter data. Radiological Society of North America Annual Meeting, Chicago IL, December 1-6, 2019.

Sweid A, Kuhn AL, Dmytriw A, Gomez-Paz S, Maragos E, Parra-Farinas C, Waqas M, Adeeb N, Salehani A, Brouwer P, **Pickett GE**, Ghuman M, Yang V, Weil A, Radovanovic I, Cognard C, Nicholson P, Renieri L, Kan P, Limbucci N, Pereira VM, Harrigan MR, Puri AS, Marotta TR, Levy EI, Moore JM, Ogilvy CS, Jabbour P, Thomas AJ. Repeat Flow Diversion for Previously Failed Flow Diversion in A Multicenter Cohort. Congress of Neurological Surgeons Annual Meeting, San Francisco CA, October 19-23, 2019.

**Pickett GE, Schmidt MH,** Shankar JS. Predicting cerebral vasospasm following aneurysmal subarachnoid hemorrhage is still an imperfect science. Canadian Neurological Sciences Federation 54th Congress, Montreal QC, June 16-19, 2019.

**Pickett GE, Vandorpe R.** Management of a maxillofacial, transclival penetrating injury. Canadian Neurological Sciences Federation 54th Congress, Montreal QC, June 16-19, 2019.

**Pickett GE, Robar JL.** Novalis Certification of stereotactic radio surgery programs: methodology and current status. Canadian Neurological Sciences Federation 54th Congress, Montreal QC, June 16-19, 2019.

## Team Members & Collaborators:

- Dr. Gwynedd Pickett, Director, Neurosurgeon
- Judith Jarrett, Research Coordinator
- Carole-Ann Miller, Specialty Nurse Practitioner
- Dr. Adrienne Weeks, Neurosurgeon
- Dr. Gordon Gubitz, Neurologist
- Dr. Stephen Phillips, Neurologist
- Dr. Laine Green, Neurologist
- Dr. William Maloney, Neuroradiologist
- Dr. Robert Vandorpe, Neuroradiologist
- Dr. Matthias Schmidt, Neuroradiologist
- Dr. Jens Heidenreich, Neuroradiologist
- Dr. Thien Huynh, Neuroradiologist
- Dr. David Volders, Neuroradiologist
- Dr. Adela Cora, Neuroradiologist
- Katharine Anderson, Administrative Assistant
- Emma Gillespie-Fraser/Liz Scott, Administrative Assistants



**BACK (L TO R):** Dr. A. Weeks, Dr. L. Green, Dr. S. Phillips, Dr. M. Schmidt, J. Jarrett

**FRONT (L TO R):** C-A. Miller, Dr. G. Pickett, Dr. G. Gubitz

# Brain Tumour Program

**Program Co-Chairs:** Drs. Adrienne Weeks and Mary McNeill

**Brain Tumour Nurse Coordinator:** Samantha Warren

**Research Coordinator:** Andrea L.O. Hebb

The Brain Tumour Program is a multidisciplinary program involving neurosurgeons, medical oncologists, radiation oncologists, neuropathologists, neuroradiologists, nurses, and trainees of each of these disciplines. Weekly meetings of the Neuro-oncology Cancer Site Team provide evidence-based recommendations for patient management. This team organizes visiting speakers and rounds, and is responsible for the development of provincial guidelines for the management of patients with brain tumours.

**The Brain Tumour Support Groups** are located in Halifax and New Glasgow.

The Halifax Group holds meetings every 2nd Tuesday of each month at:

The Lodge That Gives - 5826 South Street - Halifax, NS

The New Glasgow Group holds meetings every 3rd Monday of the month at:

The East River Manor - 695 East River Road - New Glasgow, NS

Brain Tumour Support Groups help survivors, family and caregivers through their journey with a brain tumour in a number of ways:

- Providing connections with others who have faced life with a brain tumour thereby offering reassurance, reducing feelings of isolation and reinforcing a positive, hopeful attitude.

- Sharing practical information to:
  - o help make informed decisions about brain tumour treatment options.
  - o learn about relevant community resources.
  - o enhance coping skills in order to reduce anxiety, feelings of loss of control and fear of the unknown, changes in family roles, and financial strain as a result of a brain tumour diagnosis.

See more at: <http://www.braintumour.ca/280/halifax-novascotia#sthash.TwDcHPLw.dpuf>

## Team Members

- Dr. Adrienne Weeks, Neurosurgeon, Co-Chair CNS CST
- Dr. Mary McNeill, Medical Oncologist, Co-Chair CNS CST
- Dr. Simon Walling, Neurosurgeon
- Dr. Dan McNeely, Neurosurgeon
- Dr. David Clarke, Neurosurgeon
- Dr. Gwynedd Pickett, Neurosurgeon
- Dr. Sean Christie, Neurosurgeon
- Dr. Sean Barry, Neurosurgeon
- Dr. Dhany Charest, Neurosurgeon, Moncton
- Samantha Warren, Neurosurgery Brain Tumour Nurse Coordinator
- Andrea Hebb, Neurosurgery Research Coordinator
- Dr. Sid Croul, Neuropathologist
- Dr. Alex Easton, Neuropathologist
- Dr. Kwamena Beecham, Radiation Oncologist
- Dr. Liam Mulroy, Radiation Oncologist
- Dr. Lara Best, Radiation Oncologist
- Dr. Robert Vadorpe, Neuroradiologist
- Heather MacKenzie, Coordinator, Cancer Care Nova Scotia
- Erin Little, Research Coordinator
- Emma Gillespie-Fraser, Administrative Assistant
- Liam Rappoldt, Student
- Kathleen Atwood, Student



**BACK (LEFT TO RIGHT):** H. MacKenzie, Dr. J. Shankar, Dr. R. Vadorpe, Dr. A. Weeks, Dr. S. Croul, Dr. S. Walling, Dr. D. Clarke  
**FRONT (LEFT TO RIGHT):** Dr. Badahdah, Dr. M. MacNeill, M. Brinson, A. Hebb, Dr. D. McNeely

# Neurotrauma and Injury Prevention Programs

**Director:** Dr. David Clarke

**Research Coordinator:** Lorelei Audas

**Research Associate:** Nelofar Kureshi

**Research Assistant:** Coralea Carey

Traumatic Brain Injury (TBI) is the leading cause of mortality and acquired disability in Canadians under the age of 40. Direct and indirect costs associated with TBI are estimated at three billion dollars annually in Canada. In the context of the aging Canadian population, total indirect costs predicted by simulated epidemiology are projected to be \$8.2 billion for TBI by 2031.

The Neurotrauma and Injury Prevention programs are dedicated to conducting research for preventative strategies and improved clinical management for TBI patients and their families. We aim to deliver targeted, evidence-based injury prevention, and clinical programming for TBI care.

## Mission

Provide leadership in injury prevention and neurotrauma research, advocacy, education and knowledge translation.

## Goals

- Participate in national traumatic brain injury research.
- Support evidence-based care solutions that improve access to neurosurgical care, reduce lengths of stay and optimize patient outcomes.
- Implement and support advocacy efforts for neurotrauma injury prevention.

## Accomplishments

- Halifax is a member site of the Canadian Traumatic Brain Injury Research Consortium (CTRC), a partnership of Canadian basic and clinician scientists focused on TBI research. Dr. Clarke is an active member, attending quarterly national meetings.

## Research

- TBI database: all TBI admissions to Neurosurgery are reviewed at TBI teaching and quality rounds, overseen by Dr. David Clarke and Dr. Simon Walling. Currently, over 2,637 cases have been reviewed for inclusion in the TBI database.
- We are the only Atlantic Canadian site participating in the “National Study of Impaired Driving in Canada” led by Dr. Jeff Brubacher and locally by Drs. David Clarke and Kirk Magee. This study will measure the prevalence of drug use, and type of drugs used, in drivers who are moderately or severely injured in a motor vehicle crash. We have collected 64 samples in a six-month period.
- “The impact of intoxication on mortality in patients with major traumatic brain injury caused by off-road vehicle crashes” is a sub study of “The investigation of the incidence and economic burden of alcohol-related traumatic brain injury in Nova Scotia”, which is a joint partnership with the Department of Health and Wellness and Trauma Nova Scotia. Between 2002-2014 there were a total of 176 cases of major TBI involving both drivers and passengers of off-road vehicles. Additional data for 2015-2019 has been requested from the Trauma Nova Scotia.
- “A National Biobank and Database for Patients with Traumatic Brain Injury”. The CanTBI study has enrolled 23 participants. This study is now closed for enrollment but follow-up study procedures are ongoing.
- “Microvascular injury and the blood brain barrier dysfunction (BBBD) as novel biomarkers and targets for treatment in traumatic brain injury” (Drs. Friedman and Clarke) uses specialized MRI neuroimaging to detect, localize, and track traumatic microvascular injury (TMI) and BBBD in TBI patients. It is now closed for enrollment.
- We have completed a pilot study “Usage of impact monitoring sensors to monitor head impact burden, concussion incidence, and traumatic microvascular injury in university football players” (led by Dalhousie Medical student, Casey Jones) which recruited five participants over a three week period. This study utilizes impact-detecting helmets in an entire university gridiron football team.

## Funding and Grants

Brain Canada Platform Support Grant, 2015-2019  
**“A National biobank and database for patients with traumatic brain injury”**

Matching contributions have been provided towards this Platform Support Grant by the Division of Neurosurgery, the Department of Surgery and Capital Health.

Principal Investigator: Jamie Hutchison

Co-Investigators: David B. Clarke and several others

Funding over three years + extended to 2019

\$3,000,000

Health Canada (Substance Use and Addictions Program – SUAP), 2019-2022

**“Monitoring and Preventing Drug-Impaired Driving in Canada”**

Principal Investigator: Jeff Brubacher

Co-Investigators: Herbert Chan, Shannon Erdelyi, Mark Asbridge, Robert Mann and the Canadian Drug-Impaired Driving Research Team (David B. Clarke, Raoul Daoust, Philip Davis, Marcel Emond, Chrystal Horwood, Rao Jagadish, Glenda Kaban, Jacques Lee, Kirk Magee, Eric Mercier, Judy Morris, Brian Rowe, Christian Vaillancourt, Erin Weldon, Ian Wishart)

Duration of support: 3 years (June 2019 - May 2022)

\$1,361,356

Canadian Institutes of Health Research, 2015-2019

**Canadian Traumatic Brain Injury Research Consortium (CTRC) / CanTBI**

Fall 2018 and Spring 2019: A Canadian Study of Predictive Models of Long-term Outcomes in Traumatic Brain Injury

Principal Investigators: Jamie Hutchison, Alexis Turgeon (co-leads) and several others

Co-Investigators: David B. Clarke and several others

Funding over four years

\$1,824,513

Department of Health Promotion and Protection, 2013-current  
**“An Investigation of the Health and Economic Outcomes of Alcohol-Related Traumatic Brain Injury in Nova Scotia”.**

Principal Investigator: David B. Clarke

Co-investigators: Simon Walling, Nelofar Kureshi, Rob Green, Mete Erdogan

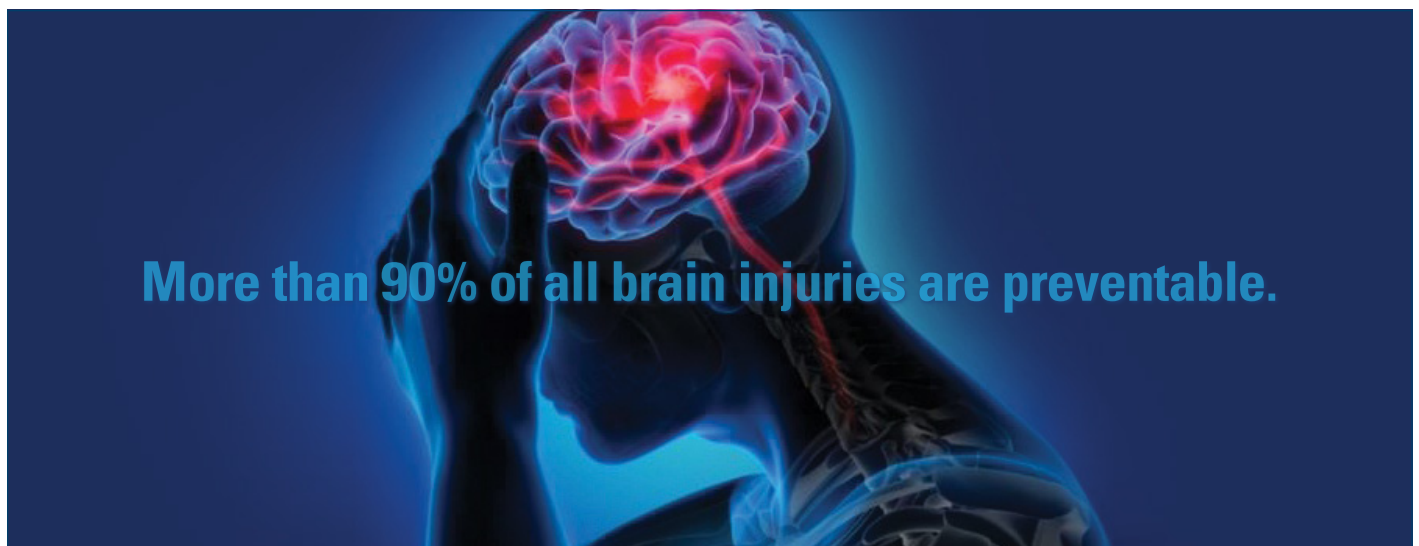
\$20,000

## Team Members:

- Dr. David Clarke, Neurosurgeon
- Dr. Simon Walling, Neurosurgeon
- Lorelei Audas, Research Coordinator
- Nelofar Kureshi, Research Associate
- Coralea Carey, Research Assistant
- Casey Jones, RIM student

## Team Collaborators

- Department of Physical Medicine and Rehabilitation
- Department of Health Promotion and Protection
- Atlantic Collaborative for Injury Prevention
- Department of Emergency Medicine
- Parachute (ThinkFirst) Canada
- Department of Critical Care
- Emergency Health Services
- Trauma Nova Scotia



**More than 90% of all brain injuries are preventable.**

# Halifax Neuropituitary Program



**Program Co-Chairs:** Drs. David B. Clarke and S. Ali Imran

## Mission

Our team is dedicated to providing world class, innovative care for patients with pituitary/parasellar tumours.

## Objectives

- To provide a comprehensive, multi-disciplinary, patient-focused team.
- To be leaders in delivering accessible and innovative health care for patients with pituitary disorders.
- To create an environment that fosters education and research.

This program, unique to the Atlantic Provinces and much of Canada, provides comprehensive care to over 2000 patients with pituitary and sellar region tumours in a multi-disciplinary clinic. Patients are seen by both Neurosurgery and Endocrinology. Collaboration with the Stereotactic Radiosurgery Group, Otolaryngology and Ophthalmology ensures coordinated assessment, treatment and follow-up. Monthly multi-disciplinary teleconference rounds are held with external sites from Nova Scotia, New Brunswick and PEI and Newfoundland and Labrador.

Our program referrals continue with 48 new HNP surgical referrals, to include Prince Edward Island (n=3), New Brunswick (n=1), Newfoundland and Labrador (n=1) and Nova Scotia (n=43) and 113 new HNP medical referrals, to include Prince Edward Island (n=2), New Brunswick (n=1), Ontario (n=1) and Nova Scotia (n=109) representing a slight increase in the number of new patient referrals from previous years.

There were 342 patient visits to the HNP medical clinic and 373 patient visits to the HNP surgical clinic in 2019.

Twenty-five transsphenoidal surgeries were performed endoscopically in 2019 by Drs. David Clarke (Neurosurgery) and Emad Massoud (Otolaryngology).

In addition, we have treated our 16th patient, as part of our Health Canada approved clinical trial on the stereotactic intracavitary instillation of 90yttrium for treatment of cystic sellar/parasellar lesions. The clinical trial is led by Dr. Clarke and being performed in collaboration with Dr. Steven Burrell and Dr. George Mawko in the Department of Diagnostic Imaging, QEII Health Sciences Centre, for treatment of HNP patients with cystic lesions.

## Research/Program Development

In collaboration with the IGNITE team of researchers (<http://igniteproject.ca/team/view/11>), we are continuing to collect sellar/parasellar tumour tissue intra-operatively under the protocol "Functional and Genetic Analysis and Banking of Neuro-Oncological Disease Tissues". We hope to develop a better understanding of the genetic and functional pathways that confer an increased risk of developing and perpetuating neuro-oncological diseases (NODs), including neuropituitary tumours.

Health Canada Phase III clinical trial "Assessment of the Efficacy of Stereotactic intracavitary instillation of 90yttrium colloid for treatment of cystic lesions of the pituitary and surrounding areas (sellar/parasellar region)" has recruited 17 patients (15 patients treated, 2 patients unenrolled).



## Poster presentations

Syed Ali Imran, Wael M. Almistehi, Andrea L.O. Hebb, Steve Doucette, Lisa Tramble, Emad Massoud, David B. Clarke. The effect of tumour staining pattern on secondary hormonal deficiency in nonfunctioning pituitary adenomas. Society for Endocrinology SfE BES, Brighton, England, Nov 11-13, 2019.

Stephanie M. Kaiser, Wael Almistehi, Andrea Hebb, David B. Clarke, Syed Ali Imran. Secondary hormonal deficiency patterns vary among different types of sellar masses despite similar size at presentation. Society for Endocrinology SfE BES, Brighton, England, Nov 11-13, 2019.

Syed Ali Imran, Andrea L.O. Hebb, Emad Massoud, Lisa Tramble, David B. Clarke  
In-hospital endocrinology consultation (IHEC) for patients undergoing transsphenoidal resection of sellar masses – is it always necessary? Society for Endocrinology SfE BES, Brighton, England, Nov 11-13, 2019.

## Team Members:

- Dr. David Clarke, Neurosurgeon
- Dr. Ali Imran, Endocrinologist
- Dr. Emad Massoud, Otolaryngologist
- Raven Glasgow, Program Clinic Coordinator
- Haley Lively, Program Clinic Coordinator (interim)
- Andrea Hebb, Neurosurgery Research Coordinator
- Lisa Tramble, Endocrinology Clinic Nurse
- Murray Hong, Neurosurgery OR Technologist
- Dr. Aditya Mishra, Ophthalmologist
- Dr. Deborah Zwicker, Endocrinologist, Sydney, NS
- Dr. Sid Croul, Neuropathologist
- Dr. Liam Mulroy, Radiation Oncologist
- Dr. Steven Burrell, Diagnostic Radiologist
- Dr. George Mawko, Diagnostic Radiologist

## Team Collaborators:

- Neuroradiology
- Nova Scotia Eye Centre
- Operating room/Unit/Clinic nursing

## Team Collaborators:

- Diagnostic Imaging
- Nova Scotia Eye Centre



**BACK (LEFT TO RIGHT):** Dr. D. Clarke, A. Hebb, Dr. A Imran, R. Glasgow, Dr. D. Zwicker  
**FRONT (LEFT TO RIGHT):** Dr. E. Massoud, D. Jardine, L. Tramble

# Maritime Lateral Skull Base Program

**Program Co-Directors:** Drs. David Morris and Simon Walling

**Program Coordinator:** Andrea L.O. Hebb



The Maritime Lateral Skull Base Clinic provides coordinated care through Otolaryngology, Neurosurgery and the Stereotactic Radiotherapy Group to patients with unilateral or bilateral vestibular schwannomas (also called acoustic neuromas) and a range of other lateral skull base tumours.

The program provides coordinated care to over 900 patients with a range of lateral skull base tumours including vestibular schwannomas, other cerebellopontine angle (CPA) tumours, lesions of the petrous apex and jugular foramen. Patients are carefully assessed and appropriate plans formulated. When treatment is required, the experts on our team provide a full range of treatment options including surgery, stereotactic radiation therapy (SRT), as well as balance and hearing rehabilitation. Our program is unique in Canada in allowing members from all disciplines to formulate management decisions in the same clinic.

Neurofibromatosis type 2 is a hereditary condition (autosomal dominant, spontaneous and mosaic) most commonly associated with bilateral vestibular schwannomas. NF2 clinics continue to be held once every 2nd month. This clinic is dedicated to patients with Neurofibromatosis Type 2 and includes collaboration with Medical Genetics, Radiology, Nova Scotia Hearing and Speech as well as Ophthalmology. We currently follow over 30 patients with NF2.

525 clinic visits occurred in 2019. There were 66 new referrals in 2019, to include 16 patients from NB, 5 patients from PEI, 1 patient from NL and 44 patients from NS. Dr. Simon Walling performed 13 surgeries (with Dr. David P. Morris and Dr. Nael Shoman) to remove CPA tumours in 2019.

In addition, 16 patients underwent stereotactic radiation therapy (SRT) to control tumour growth.

## Program Goals

- To offer a single center, multi-disciplinary approach.
- To be an internationally recognized centre for lateral skull base lesions.
- To be at the forefront of clinical research in lateral skull base lesions.
- To maintain a detailed database allowing critical appraisal of current treatment strategies.
- To be sensitive to new developments in our specialty allowing us to be critical of our practice and outcomes.
- To change our practice in light of evidence based research.

## Research in the Skull Base Program

We have developed several research fronts in this program. Some are listed below:

- What is useful hearing? Speech in noise comprehension with asymmetric hearing in acoustic neuroma subjects, when does the tumor ear stop contributing to binaural hearing?
- Database of tumor growth and outcomes. One of the largest series in the world with the “wait and scan” policy
- Patient expectations and attitudes to acoustic neuroma – questionnaire for all patients in our database
- Subjective hearing handicaps measured with standardized instruments
- Tinnitus and quality of life questionnaires added to each clinic visit.
- Quality of life related to symptomatic outcomes in patients with cerebellopontine angle tumours. NSHA REB Romeo #1022085

## Publications

Hebb ALO, Erjavec N, Morris DP, Mulroy L, Bance M, Shoman N, Walling S. Quality of life related to symptomatic outcomes in patients with vestibular schwannomas: A Canadian Centre perspective. *Am J Otolaryngol.* 2019 Mar - Apr;40 (2):236-246.

## Team Members

- Dr. Simon Walling, Neurosurgery
- Dr. David P. Morris, Otolaryngology
- Dr. Nael Shoman, Otolaryngology
- Andrea L.O. Hebb, Program Coordinator
- Dr. Anne Oonk, Otology Fellow
- Jenny Barron, RN
- Bonita Meade, Clinic Coordinator
- Adele Greene, Clinic Nurse
- Dr. Liam Mulroy, Radiation Oncology



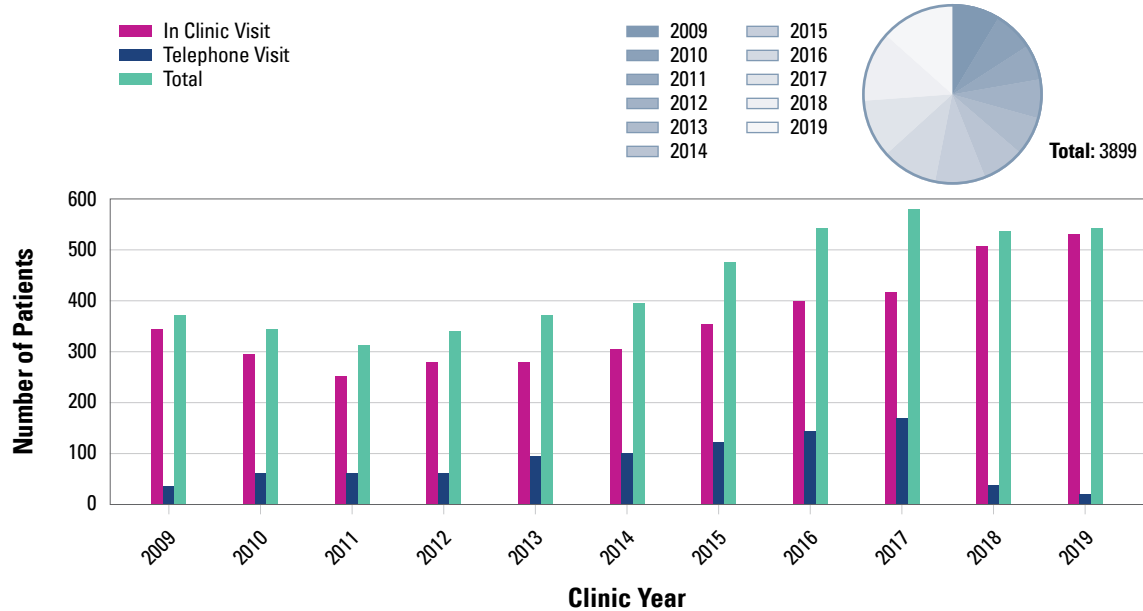
## Number of New Diagnoses by Year and Province in Maritime Lateral Skullbase Clinic



Referrals are received across Canada with the majority from the Maritime provinces. The number of new patients seen by year per province are outlined.



## Number of Patients Seen by Year in Maritime Lateral Skullbase Clinic

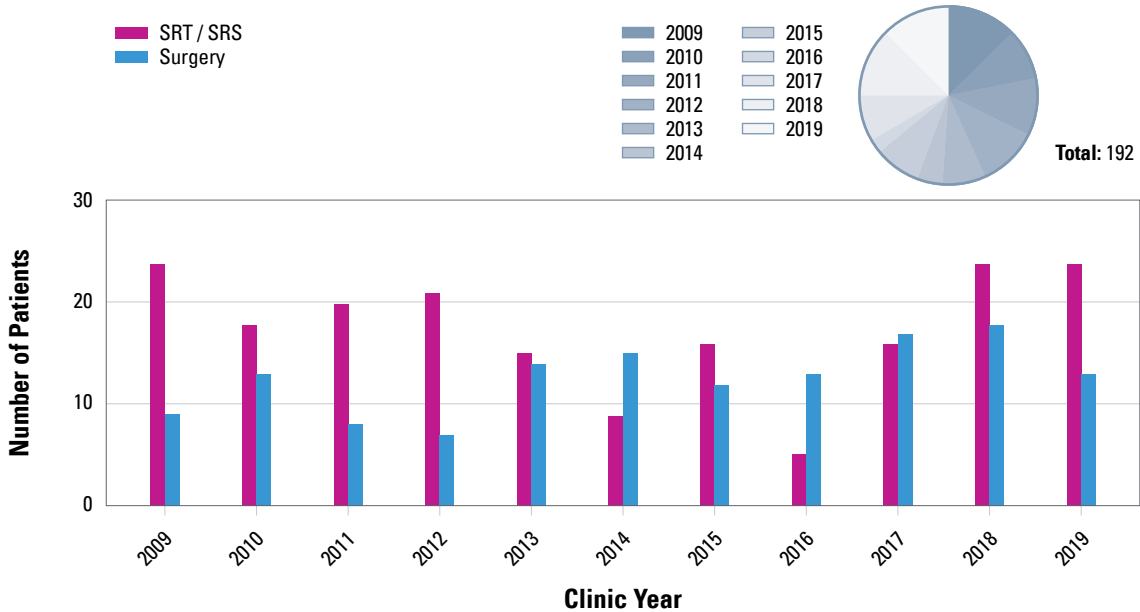


Patients are initially seen in clinic and depending on the stability of their tumour and symptoms patients may be followed periodically by telephone visits or chart checks. Patients are registered in the hospital system, MRI scans are reviewed by the team, the patient is called and a letter dictated to the family doctor. The number of in clinic and telephone visits by year are outlined in the graph. Over 500 patients were reviewed in 2016 and in clinic and telephone visits have been steadily increasing since 2012. In 2018 the telephone visit has been reserved for cases where by it is a challenge for patients to come for an in clinic visit.

# Maritime Lateral Skull Base Program (cont'd)



## Treatment 2009-2019



The number of patients treated with SRT/SRS or surgery are outlined per year since 2009.



(LEFT TO RIGHT): Dr. S. Walling, A. Hebb, Dr. N. Shoman, Dr. D. Morris, B. Meade, J. Barron

# Pediatric Neurosurgery

The goal of the Division of Neurosurgery at the IWK Health Centre is to offer the highest quality clinical service to pediatric patients of the region, in collaboration with our colleagues at referring sites. We also strive to offer high-quality teaching, and to contribute to the advancement of knowledge through our participation in research.

The Neurosurgery Kids Fund continues to support our patients and their families by supplying blankets, pillowcases, age appropriate toys, and other small gifts to patients who are hospitalized on our inpatient unit. The Fund also sponsored patients to attend Camp Brainiac at Brigadoon Village from June 30 - July 5, 2019. We are grateful to our donors and volunteers who continue to support the Neurosurgery Kids Fund. Thank you for another successful "Amelia Golf Par-Tee" fundraiser at Brookfield Golf and Country Club on July 13, 2019. Many families joined us for a fun-filled evening fundraiser at Scotia Speed World on August 30, 2019, which may become a yearly event.

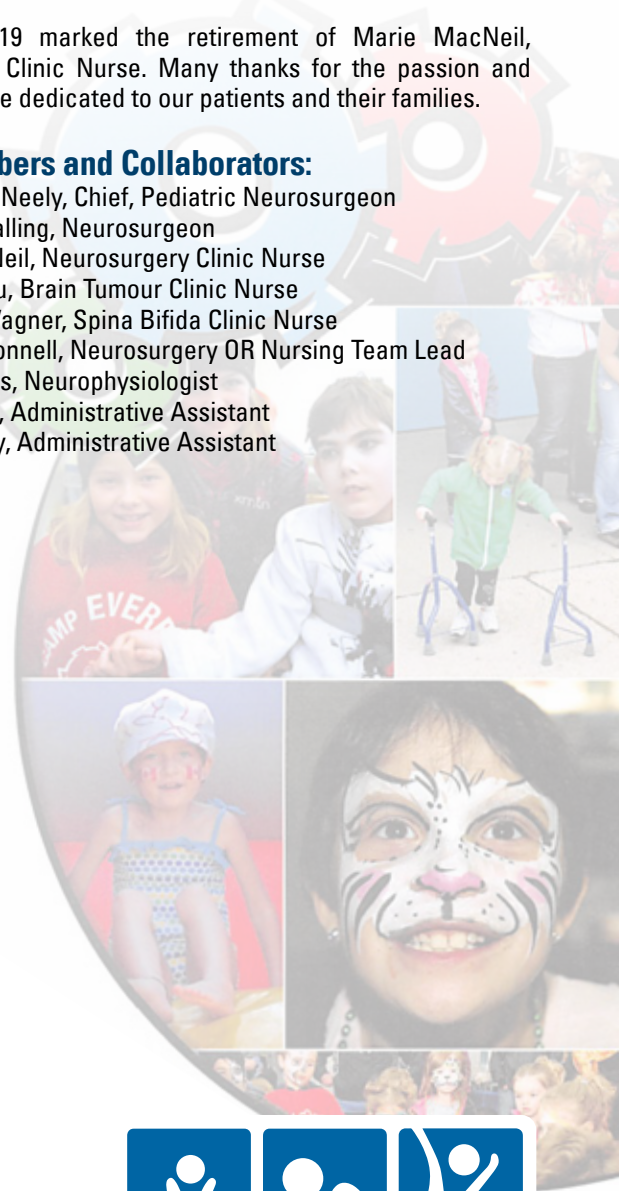
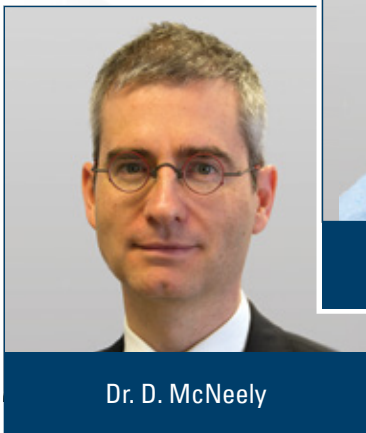
Dr. Kathryn McFadden, pediatric neuropathologist, was successfully recruited from the University of Michigan, and joined us at the IWK Health Centre in September 2019. We welcome her expertise and contributions to our patients' management. We were also pleased to welcome neurologist, Dr. Egidio Spinelli, to the IWK Health Centre.

This year marked the end of an era in the Division of Neurology, with the retirement of Dr. Joseph Dooley after a long and productive career. It was with great sadness that we learned of his passing in February 2020 after a brief illness. He is remembered as a dedicated and caring colleague with a wonderful sense of humor and a talent for teaching and storytelling.

December 2019 marked the retirement of Marie MacNeil, Neurosurgery Clinic Nurse. Many thanks for the passion and energy that she dedicated to our patients and their families.

## Team Members and Collaborators:

- P. Daniel McNeely, Chief, Pediatric Neurosurgeon
- Simon A. Walling, Neurosurgeon
- Marie MacNeil, Neurosurgery Clinic Nurse
- Kelly Boileau, Brain Tumour Clinic Nurse
- Katherine Wagner, Spina Bifida Clinic Nurse
- Shona McConnell, Neurosurgery OR Nursing Team Lead
- Susan Morris, Neurophysiologist
- Cathy Caron, Administrative Assistant
- Chrissy Shay, Administrative Assistant



IWK Health Centre

# Intra-Operative Neurophysiological Mapping & Monitoring (IONM)

**Neurophysiologist:** Dr. Susan Morris  
**Neurosurgery OR/Technical Specialist:** Dr. Murray Hong  
**Neurosurgery OR Technology Coordinator/Specialist:** Ron Hill

Intra-operative neurophysiological mapping and monitoring (IONM) uses electrophysiological methods to provide key feedback about brain, brainstem, spinal cord and nerve function during specific types of neurosurgery. As a mapping technique, IONM provides real-time functional guidance to help surgeons identify and navigate vital regions of the central nervous system. As a monitoring tool, IONM acts as an early warning signal, enabling timely intra-operative intervention and avoidance of post-operative deficits such as paralysis.

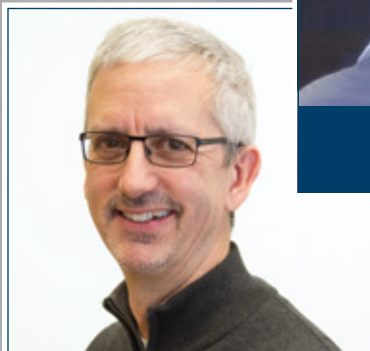
Neurosurgeries that most benefit from IONM include brain, brainstem and spinal cord tumour resections, complex spine deformity corrections and spinal cord/deep brain stimulator placement surgeries.

The IONM program in the Division of Neurosurgery is run by Dr. Susan Morris, an experienced neurophysiologist, in collaboration with Dr. Murray Hong who also brings years of experience in intraoperative neurophysiology.

In addition to clinical work, Dr. Morris is involved in research with a focus on understanding how different neurophysiological signals change in response to spinal cord compression. The goal is to improve existing intra-operative neuromonitoring methods and develop new techniques to optimize patient safety during spine surgery.



M. Hong



R. Hill



S. Morris

# Neurosurgery Basic Science Labs

Life Sciences Research Institute (LSRI)  
Brain Repair Centre (BRC)

## Spinal Cord Injury Laboratory

### Dr. Sean Christie

It has been an exciting and busy year in the Christie Lab researching various aspects of secondary spinal cord injury (SSCI) and treatments in animal models.

Dr. Mustafa Nadi is working towards his PhD studying the effects of modulating MicroRNAs in SSCI with neuroprotectants. He presented his research at the Atlantic Mobility Action Project (AMAP) annual meeting in White Point, NS in October 2019.

Mackenzie Cook completed her Honours thesis for Psychology and Neuroscience in our lab and made an excellent presentation at the poster conference in April 2019. She examined the effects of the neurohormone Melatonin on mitochondrial number and neuron survival after experimental spinal cord injury.

We were successful in securing basic research funding in Dec 2019 from the Department of Surgery to study the effects of a novel Ruthenium complex in protecting mitochondria in neurons and enhancing neuronal survival after traumatic spinal cord injury. This is possible by blocking specific mitochondrial channels responsible for uptake of toxic levels of calcium and iron post-trauma.

We started a new collaboration with Drs. Danielle Tokarz and Richard Cisek, both faculty at Saint Mary's University, studying the changes in the structure of otoconia (found in the inner ear) related to vestibular pathologies like vertigo. The novel imaging for this is enabled by a new Second Harmonic Generation (SHG) microscope built by Dr. Cisek. Kennedy Brittain from SMU worked on this project with our lab for her Honours thesis in Biology, to be presented in April 2020.

On the 'bench to bedside' theme of research, we are part of a successful team including Drs. Alex Whelan and Sonja McVeigh (Nova Scotia Rehabilitation Centre) that is funded by NSHRF to study melatonin levels during the acute period in patients with cervical spinal cord injury. This may inform us of a future study on melatonin replacement for neuroprotection in SCI patients.

In another exploratory collaboration with Dr. Bryan Crawford of University of New Brunswick, we are studying the effects of cannabis extracts on enzymes modifying the extra cellular matrix, related to neuropathic pain in zebrafish and mouse models.

Our research associate, Dr. Saranyan Pillai trains students, contributes scientifically to all these projects and supports the collaborative research from the laboratory end. He is also involved in testing novel combinatory therapies with repositioned drugs for minimizing SSCI. The following year promises to be even better with more upcoming projects and the lab recruiting new students and staff.

## Brain Tumour Laboratory

### Dr. Adrienne Weeks

Dr. Adrienne Weeks and Master's Student, Liam Rappoldt, are working on establishing better models of brain cancer using patient derived organotypic culture models and patient blood samples. This model is being used in conjunction with Dr. Jeremy Roy from Atlantic Cancer Research Institute in New Brunswick and Dr. Sidney Croul from the Department of Pathology to further understand the role of extracellular vesicles in brain tumour biology. The project is currently funded by Atlantic Genome Canada and the QEII foundation through the Brain Cancer Bash.

Dr. Weeks and Dr. Atwood (Post-doc) are working on targeting brain cancer's ability to survive and thrive in a stressful microenvironment. They are targeting a pathway of the stress response known as RNA stress granules. We look forward to a publication this year as their current paper is in review. This work is funded by the Department of Surgery at Dalhousie and the QEII Foundation through the Brain Cancer Bash.

Dr. Weeks and Dr. Croul, in coordination with the division of Neurosurgery and Pathology, started the Nova Scotia Brain Tumour Bank to aid in future research. This Nervous System Tumour Tissue Bank now contains over 80 samples of brain tumours from astrocytoma, meningioma, schwannoma and metastasis. Dr. Weeks and Dr. Croul are very grateful for the generosity of patients donating samples for research.

Dr. Weeks, Dr. McNeil (Medical Oncology) and Dr. Croul are investigating targetable mutations in meningioma in the Nova Scotia population.

Dr. Weeks and Dr. MacNeil are starting the first ever collaborative clinic for long-term brain cancer survivors in September at the Cobequid Community Health Centre, Lower Sackville, NS. This will lead to further studies understanding "survivorship" in brain cancer patients and their care givers.

We had our annual Brain Cancer Bash in November 2019 at the Lord Nelson Hotel, hosted by our patron Lori Dugan and the QEII Foundation. This was our first bash without Garry Beattie who succumbed to brain cancer in 2019. Together we have raised over \$270 000.

# Research Funding

Principal Investigator: **Jacob Alant**  
 Co- Investigator: **Sean Christie**  
 Nova Scotia Health Authority Research Fund  
 Occult Bacterial Discitis and Modic Change in Patients  
 Receiving Surgical Therapy for Lumbar Disc Herniation  
 2019 - 2020  
 \$30,000

Principal Investigator: Dr. Farhad Pirouzmand  
 Co- Investigator: **Sean Christie**  
 Canadian Institutes of Health Research  
 Prophylaxis for Venous Thromboembolism in Severe  
 Traumatic Brain injury (PROTEST): A Double Blind  
 Randomized Controlled Trial  
 2019 - 2023  
 \$742,000

Principal Investigator: Dr John Frampton  
 Co- Principal Investigator: **Sean Christie**  
 CRCC – New Frontiers in Research Fund - Exploration  
 Flexible Biomaterial Fibers for Nerve Repair and Regeneration  
 2019 - 2021  
 \$250,000

Principal Investigator: Dr. Syed Abidi  
 Co- Principal Investigator: **Sean Christie**  
 Canadian Institutes of Health Research  
 Predictive Modelling to Predict Personalized Spinal Surgery  
 Outcomes: A Data Driven e-Health Platform for Informed and  
 Evidence-based Decision Making Triage Spinal Surgeries  
 2019 - 2020  
 \$199,408

Principal Investigator: Dr. Sonja McVeigh  
 Co- Investigator: **Sean Christie**  
 Nova Scotia Health Authority Research Fund  
 Plasma Melatonin Levels After Acute Traumatic Spinal  
 Cord Injury in Individuals with Complete and Incomplete  
 Cervical and Thoracic Spinal Cord Injury  
 2019 - 2021  
 \$75,000

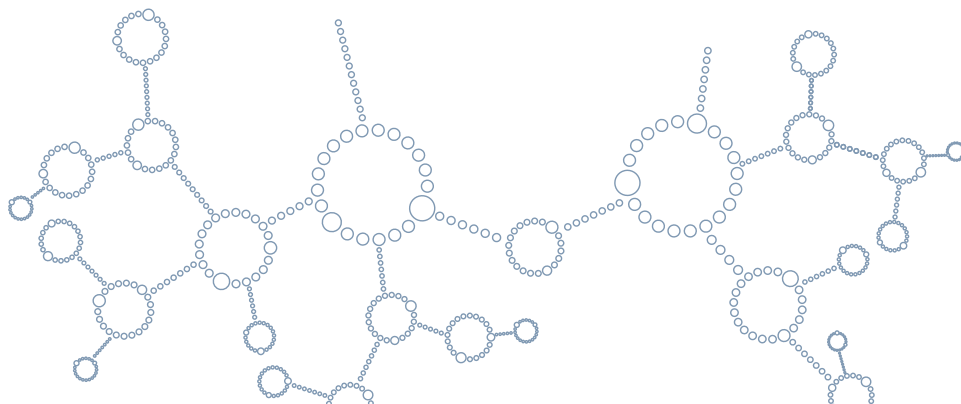
Principal Investigator: **Sean Christie**  
 Medtronic Canada  
 Prospective Registry of Clinical Outcomes following  
 Elective Spine Surgery  
 2018-2019  
 \$40,000

Principal Investigator: **Sean Christie**  
 Brain Repair Centre: Knowledge Translation Grant  
 Time is Spine: Minimizing Secondary Spinal Cord Injury  
 by Hyper-Acute Delivery of a Combination of Pleiotropic  
 Neuroprotectants  
 2018-2019  
 \$30,000

Principal Investigator: **Sean Christie**  
 Nova Scotia Health Authority Research Fund  
 Can We Predict Long Term Success of Permanent Spinal  
 Cord Stimulators?  
 2018-2020  
 \$25,000

Principal Investigator: **Sean Christie**  
 Department of Surgery  
 Neuronal Protection Following Spinal Cord Injury through  
 Inhibition of the Mitochondrial Calcium Uniporter  
 2019 - 2021  
 \$49,122

Principal Investigator: **Sean Christie**  
 Nova Scotia Health Authority Research Fund  
 Implementation of an Enhanced Recovery after Surgery (ERAS)  
 Protocol for Spine Surgery at the QE II  
 2019  
 \$3000





Principal Investigator: Alon Friedman  
 Clinical Site Investigator: **David B. Clarke**  
 Co-Investigators: Several others including **Simon Walling**  
 Canadian Institutes of Health Research  
 Project Grant: 2016 1st Live Pilot (2016-03-01). Microvascular  
 Injury and Blood-Brain Barrier Dysfunction as Novel Biomarkers  
 and Targets for Treatment in Traumatic Brain Injury  
 Funding over five years (\$190,000 per year)  
 2016-2021  
 \$950,000

Principal Investigators: Jamie Hutchison, Alexis Turgeon (co-  
 leads)  
 Co-Investigators: **David B. Clarke** and several others  
 Canadian Institutes of Health Research  
 Canadian Traumatic Brain Injury Research Consortium (CTRC)  
 Fall 2018 and Spring 2019: A Canadian Study of Predictive  
 Models of Long-term Outcomes in Traumatic Brain Injury  
 2015-2019  
 \$1,824,513

Principal Investigator: Steven D. Beyea  
 Co-Investigators: **David B. Clarke**, and several others  
 Research Nova Scotia Innovation Trust Grant and Atlantic  
 Canada Opportunities Agency, Business Development  
 Program (ACOA BDP) Award  
 Optimization & Validation of a Novel Emergency Department  
 Point-of-Care MRI  
 2018-2019  
 \$1,960,160 (RNST, ACOA)

Principal Investigator: Jeff Brubacher  
 Co-Investigators: **David B. Clarke** and several others  
 Health Canada (Substance Use and Addictions  
 Program – SUAP)  
 Monitoring and Preventing Drug-Impaired Driving in Canada  
 2019-2022  
 \$1,361,356

Principal Investigator: Dr. S.A. Imran  
 Co-Investigators: **David B. Clarke** and several others  
 Nova Scotia Health Authority Research Fund  
 Acromegaly Facial Features – Novel Strategies  
 Comparing Patients, Specialists and Computerized  
 Facial Recognition Software  
 2019  
 \$25,000

Principal Investigator: Jamie Hutchison  
 Co-Investigators: **David B. Clarke** and several others  
 Brain Canada Platform Support Grant  
 A National biobank and database for patients with  
 traumatic brain injury  
 Matching contributions have been provided towards this  
 Platform Support Grant by the Division of Neurosurgery,  
 the Department of Surgery and Capital Health  
 2015-2019  
 \$3,000,000

Principal Investigator: **David B. Clarke**  
 Co-investigators: Simon Walling, Nelofar Kureshi, Rob Green,  
 Mete Erdogan  
 Department of Health Promotion and Protection, 2013-current  
 An Investigation of the Health and Economic Outcomes of  
 Alcohol-Related Traumatic Brain Injury in Nova Scotia  
 2013-2019  
 \$20,000

Principal Investigator: **Lutz Weise**  
 Boston Scientific  
 Vercise Registry  
 2018-2020  
 \$50,000

Principal Investigator: **Lutz Weise**  
 Department of Surgery  
 Optimizing Deep Brain Stimulation Targeting using Motor  
 Evoked Potentials  
 2019  
 \$49,539

# Publications

Ailon T, Tee J, Manson N, Hall H, Thomas K, Rampersaud YR, Yee A, Dea N, Glennie A, Bailey C, **Christie S**, Weber MH, Nataraj A, Paquet J, Johnson M, Norton J, Ahn H, McIntosh G, Fisher CG. Patient-reported outcomes following surgery for degenerative spondylolisthesis: comparison of a universal and multi-tier health care system. *Spine J*, 19(1):24-33, 2019.

**Althagafi A**, Ekong C, Wheelock BW, Moulton R, Gorman P, Reddy K, Christie S, Fleetwood I, **Barry S**. Canadian neurosurgeons' views on medical assistance in dying (MAID): a cross-sectional survey of Canadian Neurosurgical Society (CNSS) members. *J Med Ethics*, 45(5):309-313, 2019.

Behmanesh B, Gessler F, Schnoes K, Dubinski D, Won SY, Konczalla J, Seifert V, **Weise L**, Setzer M. Infective endocarditis in patients with pyogenic spondylodiscitis: implications for diagnosis and therapy. *Neurosurg Focus*, 46(1):E2, 2019.

Bond M, McIntosh G, Fisher C, Jacobs B, Johnson M, Bailey CS, **Christie S**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Wilson J, Manson N, Hall H, Thomas K, Rampersaud YR, Dea N; Canadian Spine Outcomes and Research Network (CSORN) group. Treatment of Mild Cervical Myelopathy: Factors Associated With Decision for Surgical Intervention. *Spine (Phila Pa 1976)*, 44(22):1606-1612, 2019.

Glennie RA, **Barry SP**, **Alant J**, **Christie S**, Oxner WM. Will cost transparency in the operating theatre cause surgeons to change their practice? *J Clin Neurosci*, 60:1-6, 2019.

Guerreiro Stucklin AS, Ryall S, Fukuoka K, Zapotocky M, Lassaletta A, Li C, Bridge T, Kim B, Arnoldo A, Kowalski PE, Zhong Y, Johnson M, Li C, Ramani AK, Siddaway R, Nobre LF, de Antonellis P, Dunham C, Cheng S, Boué DR, Finlay JL, Coven SL, de Prada I, Perez-Somarriba M, Faria CC, Grotzer MA, Rushing E, Sumerauer D, Zamecnik J, Krskova L, Garcia Ariza M, Cruz O, Morales La Madrid A, Solano P, Terashima K, Nakano Y, Ichimura K, Nagane M, Sakamoto H, Gil-da-Costa MJ, Silva R, Johnston DL, Michaud J, Wilson B, van Landeghem FKH, Oviedo A, **McNeely PD**, Crooks B, Fried I, Zhukova N, Hansford JR, Nageswararao A, Garzia L, Shago M, Brudno M, Irwin MS, Bartels U, Ramaswamy V, Bouffet E, Taylor MD, Tabori U, Hawkins C. Alterations in ALK/ROS1/NTRK/MET drive a group of infantile hemispheric gliomas. *Nat Commun*, 10(1):4343, 2019.

**Hebb ALO**, Erjavec N, Morris DP, Mulroy L, Bance M, Shoman N, **Walling S**. Quality of life related to symptomatic outcomes in patients with vestibular schwannomas: A Canadian Centre perspective. *Am J Otolaryngol*, 40(2):236-246, 2019.

Kern M, Setzer M, **Weise L**, Mroe A, Frey H, Frey K, Seifert V, Duetzmann S. Upright MRI after decompression of spinal stenosis and concurrent spondylolisthesis. *Neurosurg Focus*, 46(5):E14, 2019.

**MacLean MA**, Mukhida K, Shankar JJS, Schmidt MH, **Clarke DB**. Complete recovery following transorbital penetrating head injury traversing the brainstem: case report. *J Neurosurg Pediatr*, 6:1-5, 2019.

**Pickett GE**, Hazelton L. Electroconvulsive Therapy After Flow Diversion Stenting of Intracranial Aneurysm. *J ECT*, 35(2):e17-e19, 2019.

Renne B, **Radic J**, Agrawal D, Albrecht B, Bonfield CM, Cohrs G, Davis T, Gupta A, **Hebb ALO**, Lamberti-Pasculli M, Knerlich-Lukoschus F, Lindsay S, **McNeely PD**, Pillai S, Rai HIS, Sborov KD, Vitali A, **Walling S**, Woerdeman P, Suryaningtyas W, Cochrane D, Singhal A, Steinbok P. Cerebellar mutism after posterior fossa tumor resection in children: a multicenter international retrospective study to determine possible modifiable factors. *Childs Nerv Syst*, Jan 18, 2019.

Sharifi B, McIntosh G, Fisher C, Jacobs WB, Johnson M, Bailey CS, **Christie S**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Manson N, Hall H, Thomas KC, Rampersaud YR, Dea N. Consultation and Surgical Wait Times in Cervical Spondylotic Myelopathy. *Can J Neurol Sci*, 46(4):430-435, 2019.

Srinivas S, Paquet J, Bailey C, Nataraj A, Stratton A, Johnson M, Salo P, **Christie S**, Fisher C, Hall H, Manson N, Rampersaud YR, Thomas K, McIntosh G, Dea N. Effect of spinal decompression on back pain in lumbar spinal stenosis: a Canadian Spine Outcomes Research Network (CSORN) study. *Spine J*, 19(6):1001-1008, 2019.

Staudt MD, Joswig H, **Pickett GE**, MacDougall KW, Parrent AG. Percutaneous glycerol rhizotomy for trigeminal neuralgia in patients with multiple sclerosis: a long-term retrospective cohort study. *J Neurosurg*, 12:1-9, 2019.

Tigchelaar S, Gupta R, Shannon CP, Streijger F, Sinha S, Flibotte S, Rizzuto MA, Street J, Paquette S, Ailon T, Charest-Morin R, Dea N, Fisher C, Dvorak MF, Dhall S, Mac-Thiong JM, Parent S, Bailey C, **Christie S**, Van Keuren-Jensen K, Nislow C, Kwon BK. MicroRNA Biomarkers in Cerebrospinal Fluid and Serum Reflect Injury Severity in Human Acute Traumatic Spinal Cord Injury. *J Neurotrauma*, 36(15):2358-2371, 2019.

# Presentations

Ahn H, Davtayan A, Bailey C, **Christie SD**, Wai E, Weber M, Thomas K, Yee A, Dea N, Fisher C, Soroceanu A, Paquet J, Phan P, Rampersaud R, Jarzem P, Cushnie D. Are there gender-based differences in outcomes for elective lumbar spine surgery in Canada? Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S50, 2019.

Almistehi W, AlQahtani S, Mustafa S, Vaninetti N, Imran F, **Hebb ALO**, **Clarke DB**, Imran SA. Patterns of Secondary Hormonal Deficiency Vary among Different Types of Sellar Masses Despite Similar Tumour Size at Presentation. Endo 2019, New Orleans, LA, March 23-26, 2019. Journal of the Endocrine Society, Vol. 3, Issue Supplement 1, MON-LB076, 15 April, 2019.

Attabib N, O'Connell C, Kurban D, Rivers CS, Noonan VK, Ethans K, Flett H, Bailey CS, **Christie SD**, Tsai EC, Furlan JC. Factors associated with motor, sensory, bladder and bowel function recovery after traumatic cauda equina injury (TCEI). North American Spine Society, Chicago, IL. Spine J 19(9): S49-50, 2019.

Badhiwala J, Wilson J, Jacobs B, Johnson M, Bailey C, **Christie SD**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Manson N, Hall H, Thomas K, Rampersaud R, McIntosh G, Fisher C, Dea N. Minimum clinically important difference in patient reported outcomes for cervical spondylotic myelopathy: an analysis from the Canadian Spine Outcomes and Research Network. Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S48, 2019.

**Clarke DB**, Galilee A, Kureshi N, Hong M. Simulation-Based Training for Neurosurgical Instrument Recognition: Virtual Reality vs Ipad Applications. American Association of Neurological Surgeons conference abstract presentation, San Diego, California, April 2019.

**Clarke DB**, Kureshi N, Galilee A, Fenerty L, Thibault-Halman G, Hong M, D'Arcy RCN. Knowledge Retention and Transfer of Simulation-Based Learning for Neurosurgical Instruments: A Randomized Trial of Perioperative Nurses. International meeting on Simulation in Health Care (IMSH), San Antonio, TX. January 2019.

**Dakson A**, **Christie SD**, Jacobs B, Johnson MG, Bailey CS, Charest-Morin R, Paquet J, Nataraj A, Cadotte DW, Wilson J, Manson NA, Hall H, Thomas KC, Rampersaud RY, McIntosh G, Fisher CG, Dea N. Neck and arm pain after surgery for cervical myelopathy: outcomes and predictors of improvement. Canadian Neuroscience Federation, Montreal, PQ. CNJNS 46(S1): S12, 2019.

**Dakson A**, **Christie SD**, Jacobs B, Johnson MG, Bailey CS, Charest-Morin R, Paquet J, Nataraj A, Cadotte DW, Wilson J, Manson NA, Hall H, Thomas KC, Rampersaud RY, McIntosh G, Fisher CG, Dea N. Neck and arm pain after surgery for cervical myelopathy: outcomes and predictors of improvement. Canadian Spine Society Toronto, Ontario. Can J Surg (4 Suppl 1); S84, 2019.

**Dakson A**, Kameda-Smith M, Staudt MD, Laverigne P, Eagles M, Elliott C, Lorio-Morin C, Makarenko S, **Althagafi A**, Touchette CJ, Tso MK and **Christie SD**. A nation-wide prospective multi-centre study of external ventricular drainage accuracy, safety and related complications. Canadian Neuroscience Federation, Montreal, PQ. CJNS 46(S1): S13, 2019.

Evaniew N, Charest-Morin R, Jacobs B, Johnson MG, Bailey CS, **Christie SD**, Paquet J, Nataraj A, Cadotte DW, Wilson J, Manson NA, Hall H, Thomas KC, Rampersaud RY, McIntosh G, Fisher CG, Dea N. Importance of sagittal alignment in cervical spondylotic myelopathy: an observational study from the Canadian Spine Outcomes and Research Network. North American Spine Society, Chicago, IL. Spine J 19(9): S114, 2019.

Evaniew N, Charest-Morin R, Jacobs B, Johnson MG, Bailey CS, **Christie SD**, Paquet J, Nataraj A, Cadotte DW, Wilson J, Manson NA, Hall H, Thomas KC, Rampersaud RY, McIntosh G, Fisher CG, Dea N. Importance of sagittal alignment in cervical spondylotic myelopathy: an observational study from the Canadian Spine Outcomes and Research Network. Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S49, 2019.

Green RS, Erdogan M, Kureshi N, Fenerty L, Thibault-Halman G, **Walling S**, **Clarke DB**. Association between Hypotension and Mortality in Critically Ill Patients with Severe Traumatic Brain Injury: Experience at a Single Canadian Trauma Center. Trauma 2019 Annual Scientific Meeting & Conference, Calgary, AB. Can J Surg, Vol. 62 (3 Suppl 2) S27, 2019.

Imran SA, Almistehi W, **Hebb ALO**, Doucette S, Massoud E, Croul S, Tramble L, **Clarke DB**. The Effect of Tumor Staining Pattern on Secondary Hormonal Deficiency in Nonfunctioning Pituitary Adenomas. Society for Endocrinology, BES 2019, Brighton, England. Endocrine Abstracts, Volume 65, P276, 2019.

## Presentations (cont'd)

Imran SA, **Hebb ALO**, Massoud E, Tramble L, **Clarke DB**. In-Hospital Endocrinology Consultation (IHEC) for Patients Undergoing Transsphenoidal Resection of Sellar Masses – Is It Always Necessary? Society for Endocrinology, BES 2019, Brighton, England. Endocrine Abstracts, Volume 65, P296, 2019.

Inglis T, Dvorak M, Banaszek D, Evaniew N, Kurban D, Fallah N, Noonan V, Bailey C, **Christie SD**, Drew B, Fehlings M, Finkelstein J, Fisher C, Fournay D, Townson A, Tsai E, Waheed Z, Kwon B, RHSCIR Network. Predicting mortality following traumatic cervical spinal cord injury in the elderly. Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S67, 2019.

Inglis T, Dvorak M, Banaszek D, Evaniew N, Kurban D, Fallah N, Noonan V, Bailey C, **Christie SD**, Drew B, Fehlings M, Finkelstein J, Fisher C, Fournay D, Townson A, Tsai E, Waheed Z, Kwon B, RHSCIR Network. Predicting mortality following traumatic cervical spinal cord injury in the elderly. North American Spine Society, Chicago, IL. Spine J 19(9): S121, 2019.

Inglis T, Dvorak M, Banaszek D, Evaniew N, Kurban D, Fallah N, Noonan V, Rivers C, Bailey C, **Christie SD**, Drew B, Fehlings M, Finkelstein J, Fisher C, Fournay D, Townson A, Tsai E, Waheed Z, Kwon B, RHSCIR Network. Does surgical intervention alter outcome in elderly patients with traumatic spinal cord injury? Canadian Spine Society Toronto, Ontario. Can J Surg (4 Suppl 1); S70, 2019.

Kaiser S, Almistehi W, **Hebb ALO**, **Clarke DB**, Imran SA. Secondary hormonal deficiency patterns vary among different types of sellar masses despite similar size at presentation. Society for Endocrinology, BES 2019, Brighton, England. Endocrine Abstracts, Volume 65, P277, 2019.

**Leck E**, **Barry S**, Ekong C, Wheelock B, Moulton R, Gorman P, Reddy K, **Christie SD**, Fleetwood I. The opinion of Canadian spine surgeons on medical assistance in dying (MAiD): a cross-sectional survey of Canadian Spine Society. Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S73, 2019.

**Leck E**, **Barry S**, Ekong C, Wheelock B, Moulton R, Gorman P, Reddy K, **Christie SD**, Fleetwood I. The opinion of Canadian spine surgeons on medical assistance in dying (MAiD): a cross-sectional survey of Canadian Spine Society. Canadian Neuroscience Federation, Montreal, PQ. CNJNS 46(S1): S44, 2019.

Nurmsoo S, Guida A, Wong A, Aviv RI, Demchuk A, Gladstone DJ, Flaherty ML, Dar D, Gubitz G, Phillips SJ, **Weeks A**, **Pickett GE**, Volders D, Vondorpe R, Huynh T. Training and validation of Deepmedic machine learning tool for automated hematoma segmentation and volume analysis on CT using Multicenter data. Radiological Society of North America annual meeting, Chicago, IL. 2019.

**Pickett G**. Management of a maxillofacial, transclival penetrating injury. Canadian Neurological Sciences Federation, Montreal, QC. June 2019.

**Pickett G**. Novalis Certification of stereotactic radio surgery programs: methodology and current status. Canadian Neurological Sciences Federation, Montreal, QC. June 2019.

**Pickett G**. Predicting cerebral vasospasm following aneurysmal subarachnoid haemorrhage is still an imperfect science. Canadian Neurological Sciences Federation, Montreal, QC. June 2019.

**Pickett G**. Repeat Flow Diversion for Previously Failed Flow Diversion in A Multicenter Cohort (platform presentation). Congress of Neurological Surgeons. San Francisco, CA, October 2019.

Wilson J, Badhiwala J, Jacobs B, Johnson M, Bailey C, **Christie SD**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Manson N, Hall H, Thomas K, Rampersaud R, McIntosh G, Fisher C, Dea N. Rates and predictors of return to work after surgery for cervical spondylotic myelopathy: analysis from the Canadian Spine Outcomes and Research Network (CSORN). North American Spine Society, Chicago, IL. Spine J 19(9): S215-216, 2019.

Wilson J, Badhiwala J, Jacobs B, Johnson M, Bailey C, **Christie SD**, Charest-Morin R, Paquet J, Nataraj A, Cadotte D, Manson N, Hall H, Thomas K, Rampersaud R, McIntosh G, Fisher C, Dea N. Rates and predictors of return to work after surgery for cervical spondylotic myelopathy: analysis from the Canadian Spine Outcomes and Research Network (CSORN). Canadian Spine Society, Toronto, Ontario. Can J Surg (4 Suppl 1); S46, 2019.

# Invited Lectures

**Alant J.** "Where Nerves Meet the Spine: Should Nerve Injury Classification Be Updated?" 8th Annual McMaster Neuroscience Day Symposium. Hamilton, Ontario, May 2019.

**Christie SD.** "Evidence-Based, Practical Approach to C-spine Clearance." Atlantic Canadian Spine Meeting. Fox Harbour Resort, NS. October 2019.

**Christie SD.** "Enhanced Recovery After Surgery(ERAS) – Spine Specific Protocol." Atlantic Canadian Spine Meeting. Fox Harbour Resort, NS. October 2019.

**Christie SD.** "Should We Be Thinking About Cervical Balance." Atlantic Canadian Spine Meeting. Fox Harbour Resort, NS. October 2019.

**Clarke DB.** "Surgical Treatment of Epilepsy: Cutting for the Fits." Ophthalmology Grand Rounds. QEII Halifax Infirmary. Halifax, NS. December 4, 2019.

**Clarke DB.** "Simulation-Based Training for Neurosurgical Instrument Recognition: The Halifax Experience", Simulation & Surgical Education. 54th Annual Congress of Canadian Neurological Sciences Federation, Montreal, Quebec. June 2019.

**Clarke DB.** "Pituitary Tumors Interactive Case Discussion Panel." 54th Annual Congress of Canadian Neurological Sciences Federation, Montreal, Quebec. June 2019.

**Clarke DB.** "In the Tradition of Olivier: Neurosurgery in the East." Visiting Guest Speaker, Neuro Epilepsy Day, Epilepsy Surgery, A Tribute to André Olivier, MNI / McGill, Montreal, Quebec. June 2019.

**Clarke DB.** "Transsphenoidal Teamwork: the East Coast Experience." Visiting Guest Speaker, Alberta Neurosurgical Society Annual meeting and Resident Research Day. Calgary, Alberta, March 2019.

**Clarke DB.** "Cutting for the Fits." Department of Surgery Grand Rounds, QEII Halifax Infirmary. Halifax, NS. February 2019.

**Clarke DB.** "Surgery for Epilepsy: What you should know." 7th Annual Neurosurgery Review Course. Ottawa, ON. February 2019.

**Pickett GE.** "Management of Unruptured Intracranial Aneurysms." Neurology Update XII. Sydney, NS. September 2019.

**Pickett GE.** "The Future of Vascular Neurosurgery Education in Canada." 54th Annual Congress of Canadian Neurological Sciences Federation, Montreal, Quebec. June 2019.

**Weise L.** "Spinal Cord Stimulation: Predictors of Success." Atlantic Canada Spine Meeting. Fox Harbour Resort, NS. October 2019.

**Weise L.** "DBS in the Management of PD and other Movement Disorders." Neurology Update, Sydney, NS. September 2019.

**Weise L.** "Influence of Disease Lateralization in Parkinson's on Tractography and Electrophysiology Findings." Canadian Neuromodulation Society Meeting, Iqaluit, Nunavut. July 2019.

**Weise L.** "The Influence of Disease Lateralization in Parkinson's Disease on Tractography in DBS Patients." WSSFN (World Society for Stereotactic and Functional Neurosurgery) New York City. June 2019.

**Weise L.** "Necessity of MRI-compatible Deep Brain Stimulation Systems." WSSFN (World Society for Stereotactic and Functional Neurosurgery) New York City. June 2019.

**Weise L.** "Exploring Canada-Israel collaboration opportunities in Deep Brain Navigation: Awake vs asleep DBS-from microelectrode recording to evoked potentials." Embassy of Canada to Israel, Tel Aviv. March 2019.

**Weise L.** "Operative Therapy in Functional Neurosurgery." Germany. February 2019.

**Weise L.** "Deep Brain Simulation." Clinical Academic Rounds - Psychology/Neurology. QEII Halifax Infirmary. Halifax, NS.

# Clinical Neuroscience Guest Speakers



## DR. NOREEN KAMAL

**Topic: "Improving Acute Stroke Treatment"**

**Dr. Noreen Kamal** is an Assistant Professor in Industrial Engineering at Dalhousie University. Her primary research interest is in designing and improving health care systems such that they match the progression of the disease to make significant impact on the lives of patients. She has worked in the health care sector for 15 years, where she has worked to improve emergency department flow, management of sepsis, and most recently acute stroke systems. In recent years, she has significantly improved treatment times for acute stroke patients across the entire province of Alberta. She worked with experts and hospital teams to reduce treatment times to 41 minutes from 71 minutes. Dr. Kamal is also interested in interactive information visualization and visual analytics for using health data to make informed decisions.



## DR. STEVE GIBBS

**Topic: "Clinical update on sleep-related hypermotor epilepsy"**

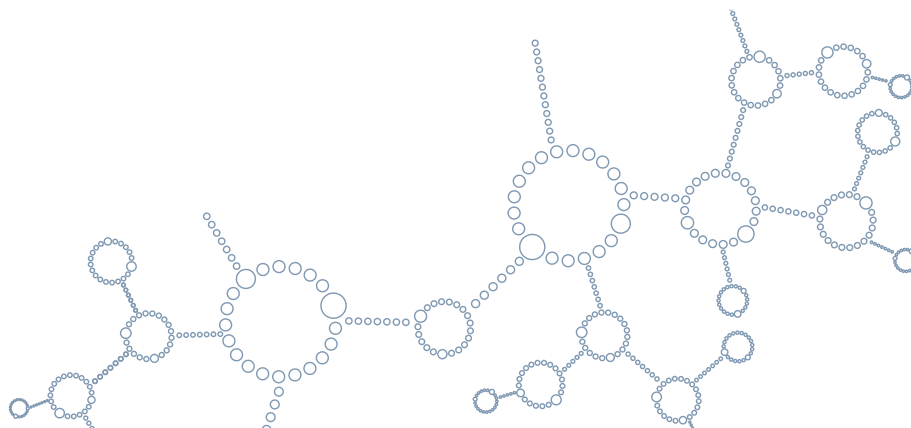
**Dr. Steven Gibbs** is an Assistant Professor of Clinical Medicine at the Université de Montréal. He joined their faculty as a neurologist-epileptologist in 2016. Dr. Gibbs is originally from Bathurst, New Brunswick. He completed his undergraduate studies at the Université de Moncton before entering medical school at the Université de Montréal. He continued his education there with a neurology residency and received his FRCP(C) in 2013. Dr. Gibbs developed an interest in sleep and epilepsy and completed a fellowship in these areas at the prestigious Munari Centre for Epilepsy Surgery in Milan, Italy. He has already published 17 papers, 2 book chapters, and has more than 12 abstracts. Among his publications is a very important paper published this year in which he reviewed the clinical features of sleep-related hypermotor epilepsy in 135 surgically treated cases.



## DR. BEN WHATLEY

**Topic: "Location, location, location: Identifying the seizure onset zone"**

**Dr. Whatley** completed his training in Adult Neurology (2013-2018) and an honours degree in Neuroscience and History and Philosophy of Science (2004-2007) at Dalhousie University. In between, he completed his undergraduate medical training and graduate degree from McGill University. He is now in the midst of a two-year fellowship in Epilepsy and Neurophysiology at the National Hospital for Neurology and Neurosurgery, Queen Square, London, UK. Current research interests include developing clinical, imaging and electrophysiological techniques to delineate the seizure onset zone in patients with medically-refractory epilepsy, as well as investigating imaging biomarkers of sudden unexpected death in epilepsy (SUDEP).





## DR. RUTH ANN MARRIE

**Topic: "Broken hearts: Acute myocardial infarction in multiple sclerosis"**

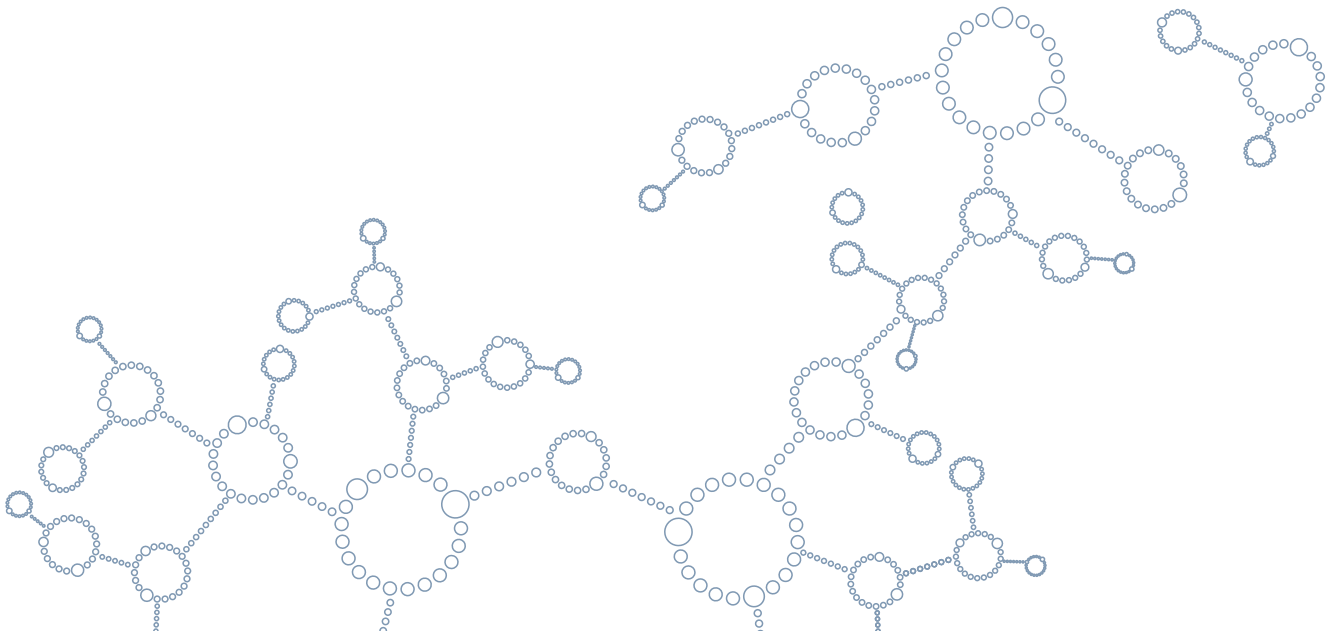
**Dr. Ruth Ann Marrie** is a Professor of Medicine and Community Health Science at the University of Manitoba. She received her undergraduate degree in chemistry and her medical degree from Dalhousie University, both with Distinction. Dr. Marrie completed neurology training at McGill University. This was followed by a fellowship in Multiple Sclerosis at the Cleveland Clinic, supported by a Sylvia Lawry Physician Fellowship Award from the National Multiple Sclerosis Society. Subsequently, she obtained a PhD in Epidemiology from Case Western Reserve University. Presently, she holds the Waugh Family Chair in Multiple Sclerosis. Dr. Marrie's research aims to understand the influence of comorbid factors, such as other chronic diseases, health behaviors, and critical illness on a range of multiple sclerosis (MS)-related health outcomes. Other areas of research interest include etiologic factors for MS, patient-reported outcomes, and pediatric MS.



## DR. TOM WAINWRIGHT

**Topic: "Enhanced Recovery after Surgery (ERAS)"**

**Dr. Wainwright** is a physiotherapist focused on quality improvement. His research is internationally recognized for his work in Enhanced Recovery after Surgery (ERAS) in orthopaedics. His research interests focus on quality improvement. He is an Associate Professor in Orthopaedics and is the Deputy Head of the Orthopaedic Research Institute at Bournemouth University, United Kingdom. Dr. Wainwright received a Bachelor of Science Honours degree in Physiotherapy at Coventry University. He completed a Postgraduate Diploma in Physiotherapy at the University of Brighton and Postgraduate Certificate in Leadership for Quality Improvement in Healthcare from the University of Teesside. Dr. Wainwright completed a Postgraduate Certificate in Education Practice and Doctoral degree in Health Management at Bournemouth University.



# Awards and Recognitions



**CLINICAL NEUROSCIENCE RESIDENT RESEARCH DAY  
2019 -TOP OVERALL PRESENTATION: LIAM RAPPOLDT**

Study: Establishing a Patient-Derived, In-Vitro Organotypic Slice Culture Model of GBM

Supervisor: Dr. A. Weeks



**CLINICAL NEUROSCIENCE RESIDENT RESEARCH DAY  
2019 - TOP STUDY PRESENTATION: MUSTAFA NADI**

Study: A Multidimensional Frailty Model that May Aid in Predicting Mortality Following Acute Traumatic Spinal Cord Injury

Supervisor: Dr. S. Christie



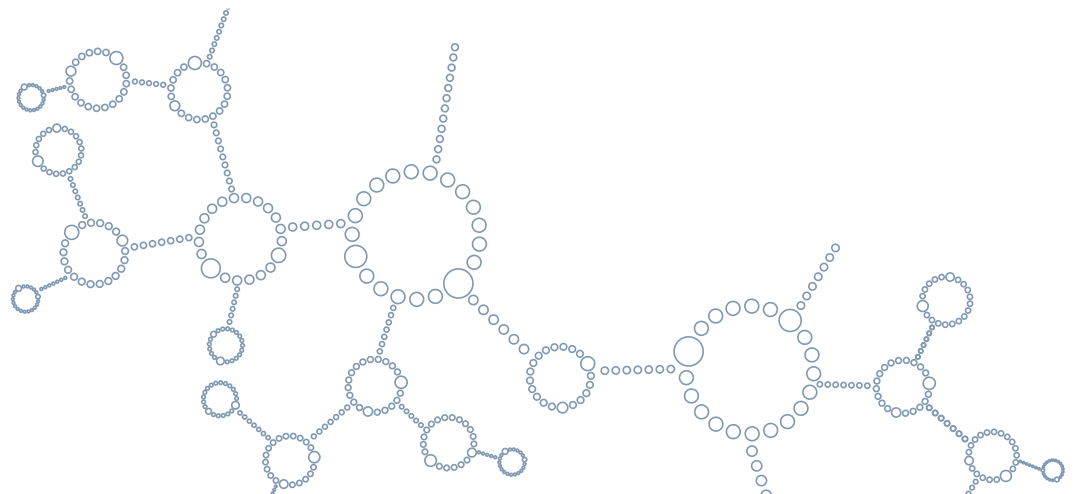
**WD STEVENSON AWARD: DAVID BRANDMAN**

Study: Automated Call Schedule Software

The WD Stevenson award is presented annually to a Neurosurgery Resident for outstanding contributions in basic and clinical research in Neurosurgery.

**CLINICAL NEUROSCIENCE RESIDENT RESEARCH DAY  
2019 - TOP NEUROSURGERY PRESENTATION: DAVID BRANDMAN**

Study: Automated Call Schedule Software







**CNSS KG MACKENZIE MEMORIAL PRIZE FOR CLINICAL NEUROSCIENCE RESEARCH: DR. AYOUB DAKSON**

2nd Prize, supervised by Dr. Sean Christie  
Study: A Nation-wide Prospective Multi-Centre Study of External Ventricular Drainage Accuracy, Safety and Related Complications

**CANADIAN NEUROMODULATION SOCIETY MEETING - BEST TRAINEE POSTER PRESENTATION**



**ACADEMIC PROMOTION:  
DR. SEAN CHRISTIE**

Congratulations to Dr. Sean Christie for his Promotion to Professor, Dalhousie University



**ATLANTIC CANADA THERAPEUTIC NEURAL-ONCOLOGY WORKING GROUP (ACTNOW): DR. ADRIENNE WEEKS**

Dr. Weeks has joined her peers to form ACTNOW, a group of clinicians and scientists interested in brain tumour research; looking at a proactive approach to change the future of care for malignant brain tumours.

**NEUROSURGERY - LEADER IN PATIENT FLOW INITIATIVES**

The Division of Neurosurgery was highlighted in the Winter edition of the Nova Scotia Health Authority's Central Zone Patient Flow/Utilization Management Update. Two electronic 40" touchscreens will display patient flow status on Neurosurgery's 7.3 unit. Nursing staff will have timely individual access to view and update current patient information including reasons for stay, plan of care and discharge notes. The electronic boards will also assist with resource planning and identifying potential barriers to patient care.

## Cross-Appointed Faculty

### Department of Anesthesia

Dr. Ian Beauprie, MD, FRCPC  
Dr. Adam Law, MD, FRCPC  
Dr. Kirk MacQuarrie, MD, FRCPC  
Dr. Thomas Coonan, MD, FRCPC  
Dr. Orlando Hung, MD, FRCPC  
Dr. Michael Schmidt, MD, FRCPC  
Dr. Carlo Mariotti, MD, FRCPC  
Dr. Karim Mukhida, MD, FRCPC

### Department of Diagnostic Radiology (Neuroradiology)

Dr. William Maloney, MD, FRCPC  
Dr. Robert Vandorpe, MD, FRCPC  
Dr. Matthias Schmidt, MD, FRCPC

### Department of Medicine (Endocrinology & Metabolism)

Dr. Ali Imran, MBBS, MRCP, FRCPC

### Department of Medicine (Physical Medicine & Rehabilitation)

Dr. Christine Short, MD, FRCPC  
Dr. Sonya McVeigh, MD, FRCPC

### Department of Pathology

Dr. Alex Easton, MD FRCPC

### Department of Radiation Oncology

Dr. Liam Mulroy, MD, FRCPC

### Department of Surgery (Orthopaedics)

Dr. Bill Oxner, MD, FRCSC  
Dr. Ron El-Hawary, MD, FRCSC

### Department of Surgery (Otolaryngology)

Dr. Emad Massoud, MD, FRCSC  
Dr. David Morris, MD, FRCS (ORL-HNS)  
Dr. Jonathon Trites, MD, FRCSC

## Affiliated Faculty

### Department of Neurosurgery, The Moncton Hospital South East Regional Health Authority, Moncton, NB

Dr. Robert Adams  
Dr. Dhany Charest  
Dr. Charbel Fawaz  
Dr. Brendan Kenny  
Dr. Gilbert Quartey  
Dr. Antonios El Helou

### Department of Neurosurgery, Saint John Regional Hospital South East Regional Health Authority, Saint John, NB

Dr. George Kolyvas  
Dr. Ayman Al-Shayji  
Dr. Najmeeden Attabib  
Dr. Andre le Roux

### Department of Neurosurgery, Health Sciences Center Eastern Health, St. John's, NL

Dr. Gerry Murray  
Dr. Andre Engelbrecht  
Dr. Greg Jenkins  
Dr. Roger Avery  
Dr. John Adams

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**Lorraine Bell-Hill**  
**Ron Hill**  
**Kelly Martin**

**HALIFAX  
NEUROSURGERY**

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ANNUAL REPORT

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**DIVISION OF NEUROSURGERY**

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Nova Scotia Health Authority  
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