

# HALIFAX NEUROSURGERY

# 20 18

ANNUAL  
REPORT





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# Message from the Head of Neurosurgery

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

One of our greatest responsibilities as an academic neurosurgical centre is the training of the next generation of neurosurgeons. With that in mind, I want to welcome our new residents who have joined our Atlantic Canadian Neurosurgery Residency Program: a warm welcome to Dr. Mark MacLean and Dr. Jae Han. The strength of our Residency Program has been traditionally based on our academic unit in Halifax; with academic training sites in Saint John, Moncton and St. John's joining our training efforts, we are well positioned to be the best training program in the country by continuing to attract the best neurosurgical trainees and faculty. I would like to thank Dr. Dan McNeely, who steps down from his position as Residency Program Director, for his hard work and dedication to our residents' training over the last ten years. Dr. McNeely now passes the torch to Dr. Gwynedd Pickett as our new Program Director. We welcome and look forward to Dr. Pickett taking on this important leadership role.

The past year has seen many changes, and I will highlight only a selected few. At the QEII Health Sciences Centre, on 7.3 – our in-patient ward. We now have a full year under our belts operationally in our new Intermediate Care Unit (IMCU) and Epilepsy Monitoring Unit (EMU) and we have seen the tremendously positive effects of these structural changes: the number of scheduled surgery cancellations has decreased significantly and the number of surgical cases for epilepsy has more than doubled. Several nurses have now completed specialized IMCU course training to support the IMCU unit. The spine service has been consolidated on 7.3, and three new Obstructive Sleep Apnea (OSA) beds will arrive early in the new year to bolster the patient care-capacity of this unit. Over the past year, our adult neurosurgical services continue to enjoy strong support from what I consider to be the best administrative team in the institution. The neurosurgical team is supported by our terrific 7.3 Health Services Manager, Fran Kelloway, and our equally terrific Director of Neurosciences, Randi Monroe.

In the operating rooms, I want to thank Jen Hoyt, our team lead of OR nursing, and Dr. Carlo Mariotti, who heads our very talented neuroanesthesia group, for their leadership. I also thank our entire OR group for working together to make Neurosurgery an institutional leader in OR efficiency. We are continually updating our imaging capabilities, an effort that is spearheaded by our Neurosurgery OR/Technical Specialist, Murray Hong. We are acquiring the latest in neuronavigation equipment and are the first unit in the country to acquire the latest O-arm intra-operative CT scanning technology. These investments are critical in supporting our busy service – and it is a busy service: 7.3 has the highest number of patient room changes per day in our institution (there is a lot of coming and going!); over the past 2 years, we are seeing greater than 20% more patients in our clinics; and admissions to hospital and number of neurosurgical procedures are also up. In response to a request by our Cape Breton Neurology colleagues to better serve our patient population, and supported by the Nova Scotia Health Authority, we have expanded our neurosurgical presence provincially by starting monthly neurosurgical clinics in Sydney. The Nova Scotia Health Authority has also supported our efforts to enhance provincial and regional neurosurgical services by strengthening our Halifax-based neurosurgical unit as we look to recruit a tenth neurosurgeon.

There have been many accomplishments in our subspecialty programs – I will highlight one effort in particular. I want to congratulate the brain tumor research effort that is being spearheaded by Dr. Adrienne Weeks, the first neurosurgeon/scientist at Dalhousie to conduct basic science research focused on brain tumors. At the second Brain Cancer Bash fundraising event, an effort initiated by Garry Beattie and Lori Duggan and now supported by the QEII Foundation, the enthusiasm for research was palpable and several hundred thousand dollars were raised for neurosurgery brain tumor research – well done Dr. Weeks and your team, including Emma Gillespie-Fraser.

At the IWK, there has been ongoing fundraising work for the Neurosurgery Kids Fund, including the 3rd annual BBQ at the end of August. The Neurosurgery Kids Fund supports many events with the neurosurgery kids, such as an afternoon at the Discovery Centre. In addition, the first week-long neurosurgery kids camp at Brigadoon was held in July – thanks to all at the IWK for their dedicated care and hard work for these children and their families. And special thanks to Marie MacNeil (our neurosurgery clinic nurse), Cathy Caron and Chrissy Shay for their many volunteer hours towards Neurosurgery Kids Fund related events.

I would be remiss if I did not mention the extra workload taken on by Dr. Simon Walling during Dr. Dan McNeely's three month absence following a bicycle crash. All of the neurosurgeons helped to fill the clinical void, but none more than Dr. Walling. I know that Dr. McNeely is very grateful, as are the rest of the neurosurgical team – thank you, Dr. Walling! I would also be remiss if I did not mention that, when Dr. McNeely did return, he did so in grand style, taking full advantage of his newfound technology skills in making Halifax the international teddy bear neurosurgical hotspot.

I would like to share a note of appreciation from the family of one of our patients. The letter was addressed to a colleague of mine, but it could have been addressed to any one of our offices. It reads (and modified slightly only to protect privacy)...

"To the Neurosurgery Staff. Our son had surgery last month; he is a Dalhousie student from Toronto and was very anxious about his midterms and studies – he certainly was put at ease and appreciated the extraordinary care he received. He is now healing well and we are enjoying having him home in Toronto for the Holidays with his family. He has an appointment with his neurosurgeon the first week of January and is looking forward to returning to his studies. I encountered such professional, kind, competent staff and for that we are truly grateful! We send our sincere thanks for your INCREDIBLE STAFF!"

And that's what we do, working together with incredible colleagues in various disciplines – in the clinic, in the OR, on our research teams, on the wards and in our offices... all of us working as a team – focused on patients who put their trust and their lives in our hands, knowing that we will provide the best of care.

That is what is celebrated in this annual report – a great neurosurgery team at the IWK, QEII and Dalhousie of whom I am immensely proud.



# 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
- Associate Professor, Department of Surgery

**Areas of Interest:**

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



**DANIEL MCNEELY** MD, FRCSC

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

**Areas of Interest:**

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



**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

# Neurosurgery Faculty (cont'd)



**SIMON WALLING** MBChB, FRCSC

• Assistant Professor, Department of Surgery

**Areas of Interest:**

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



**GWYNEDD PICKETT** MD, FRCSC

• Associate Professor, Department of Surgery

**Areas of Interest:**

- Cerebrovascular Surgery
- Endovascular Treatment of Aneurysms



**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
- Image Guided Surgery
- Neurophysiology
- Spinal Surgery

# Atlantic Canadian Neurosurgery Residency Program

**Director:** Dr. P. Daniel McNeely

**Program Administrator:** Valerie Wilson

The major objective of the Atlantic Canadian Neurosurgery Residency Program is the development of highly skilled neurosurgeons who can practice anywhere they choose. This is achieved by exposure to a broad range of clinical neurosurgery cases over a six-year period. Residents assume graduated levels of responsibility in patient care as training progresses. At the senior resident level, independent clinical and operative decision-making is promoted. Final year residents achieve confidence in neurosurgical decision making and performance of operative procedures.

We strive to provide an academic environment in which residents are continually challenged and receive the regular, quality feedback necessary to refine their professional development, decision-making and technical skills. 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 and the IWK Health Centre. Residents also pursue rotations at our affiliated Atlantic Canada neurosurgical sites in Saint John and Moncton, New Brunswick, and St. John's, Newfoundland. This provides residents with exposure to a wide variety of neurosurgical problems and training experiences.

The Division of Neurosurgery encourages 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. The Clinician Investigator Program (CIP) is available at Dalhousie University. This program, which is a minimum duration of two years, provides residents with structured research training, so they may become clinician investigators upon completion of their residency. Completion of CIP results in certification by the Royal College of Physicians and Surgeons of Canada.

Regular quality review and accreditation of all residency training programs is carried out nationally. We are pleased that the Dalhousie Neurosurgery Residency Program was favourably reviewed and fully accredited during this past year. There are currently nine neurosurgical residents in the program.

**Dr. D. McNeely**



# Neurosurgery Residents



## **AARON ROBICHAUD** MD (PGY6)

**MD Dalhousie University 2012**  
**Halifax, 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 is pursuing a Master's degree in Neuro-oncology in Dr. Weeks' laboratory. Dr. Robichaud is expected to complete his residency training with Dalhousie University in 2019.



## **JOHN ADAMS** MD (PGY6)

**MD Memorial University 2013**  
**Newfoundland, 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 is expected to complete his training with Dalhousie University in 2019.



## **DAVID BRANDMAN** MD (PGY5)

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

Dr. 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 (PGY3)

**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 (PGY2)**MD Dalhousie University 2017**  
**Halifax, 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 (PGY2)**MD National University of Ireland 2015**  
**Dublin, Ireland**

Dr. 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 (PGY1)**MD Dalhousie University 2018**  
**Halifax, 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 (PGY1)**MD Dalhousie University 2018**  
**Halifax, 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.

## NEUROSURGERY FELLOWSHIP

**AYOUB DAKSON** MBChB (Fellow), FRSCS**MD University of Manchester 2011**  
**Manchester, England**

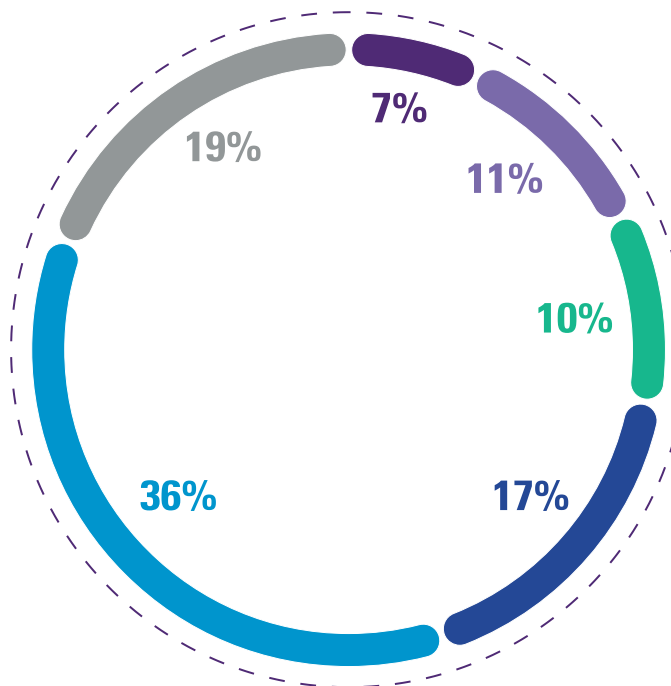
Dr. Dakson obtained his MBChB from the University of Manchester, England with a Masters' in Medical Research (Merits). Prior to this, he completed a BSc (Honours) in Medical Sciences at St. Andrew's University. Dr. Dakson completed his residency training in 2018 and began a Spine Fellowship with the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

# Clinical Activities

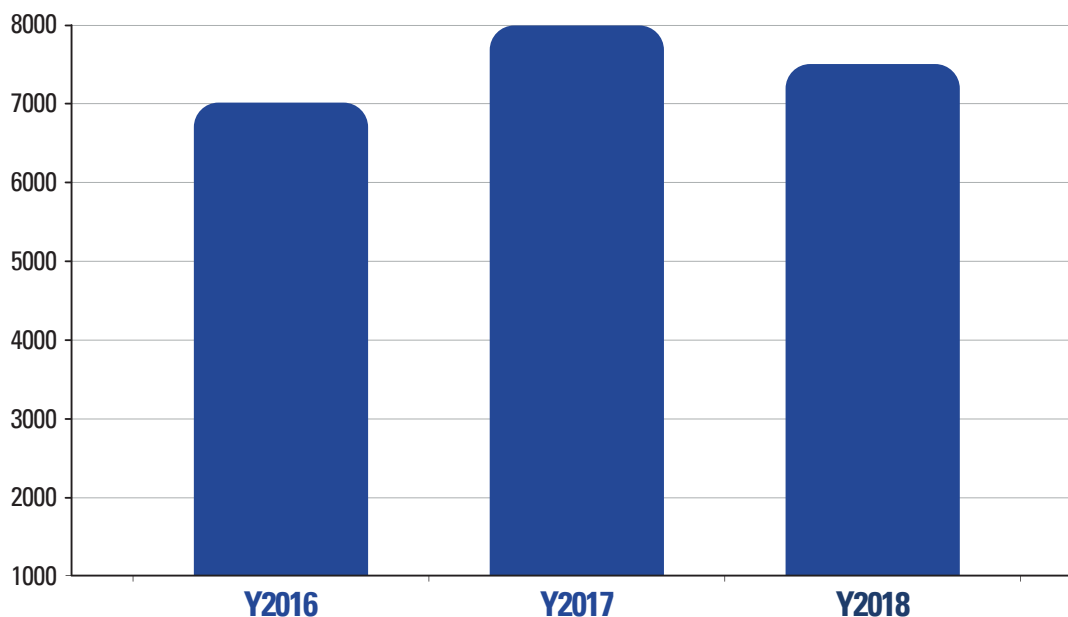


## Neurosurgical Procedures

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

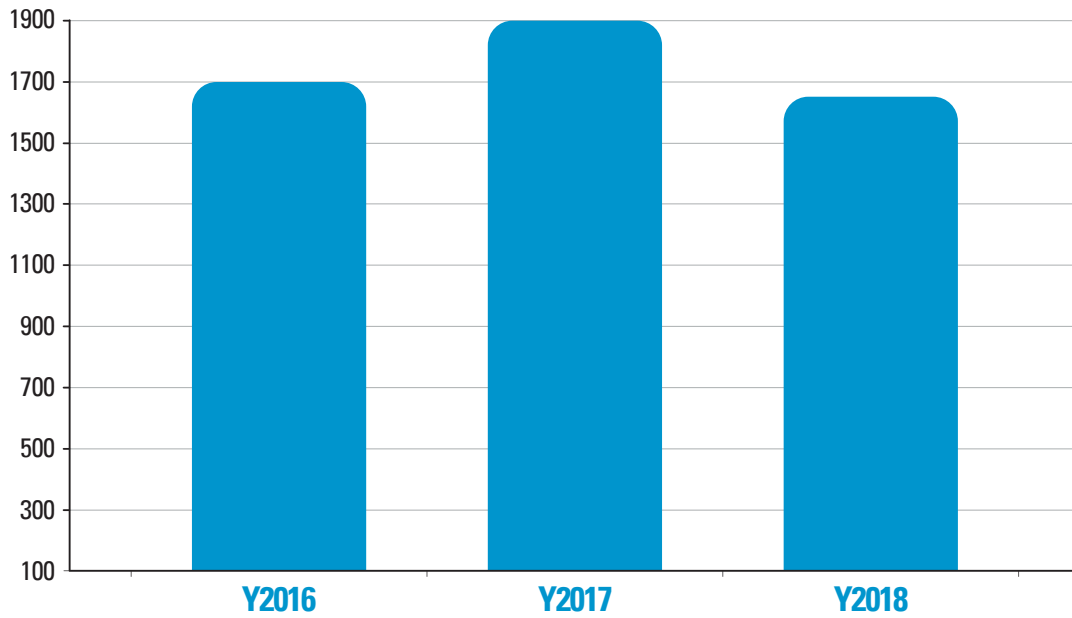


## Ambulatory Care Visits

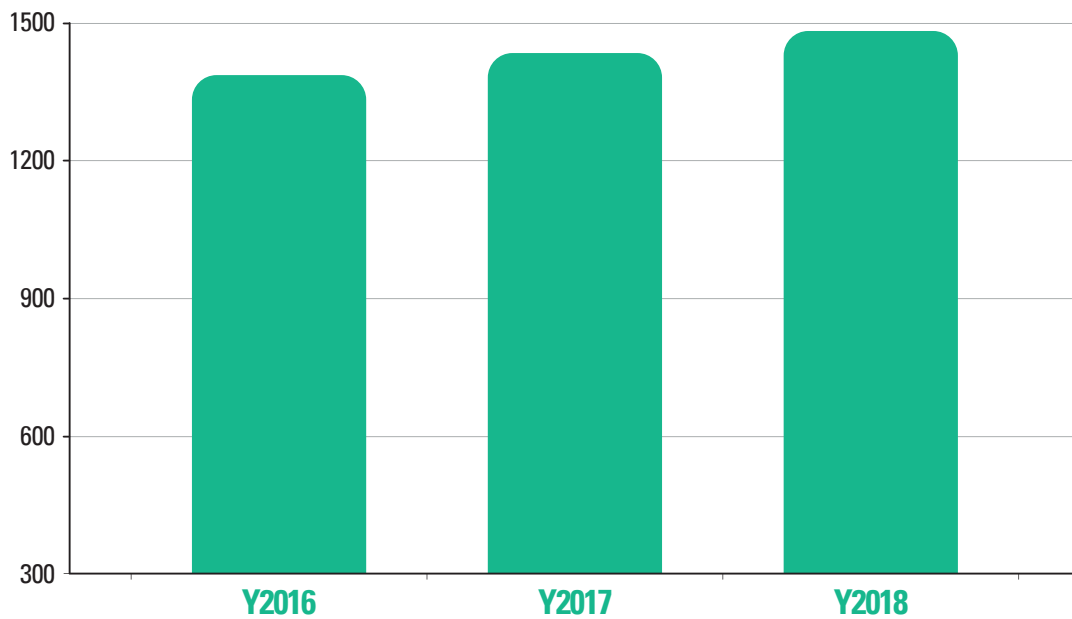




## Admissions



## Neurosurgical 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

2018 was a roller coaster year for the 7.3 Inpatient Neurosurgery Unit, filled with change and rejuvenation as well as some goodbyes. A makeover on 7.3 was completed with a freshly painted unit and an updated central station to create a more welcoming environment for our patients, families and staff. The main goal this year was to stabilize and onboard our new team members after a couple of edits to our new model of care to ensure our patients and families receive the excellence in neurosurgical care that we strive to provide.

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. While accomplishing the right model of care for our patients, it unfortunately resulted in saying good bye to our valued Neurosurgery LPNs who were displaced to other units. Thanks to Serena Landry, Angela Courtney, Dawn Manthorne, Adena McAvoy, Leanne Hache and Joy Bangayan for dedicated service to our patients and their families. In total we have hired twenty new staff RNs and twenty CTA staff this year.

In addition we have had several changes in leadership positions that support the unit:

- Charge Nurse: Laura Croft finished her term and Megan Lambert is our new charge nurse.
- Resource Nurse: Jaime Mason and Laura Croft took this temporary role for part of the year to help support the staff turnover and new staffing model.
- Neurosciences Clinical Nurse Educator: Walter Somer's assignment ended in early January and Rachel MacDougall rejoined us post maternity leave for a few months before our final change to Missy Brinson.
- Brain Tumour Nurse: As Missy left the position to take on the Educator role in July, Samantha Warren has taken on this position.

The interdisciplinary team on 7.3 has settled into their new model of care which has provided increased staffing in a number of disciplines allowing for regular recreation therapy staffing and prioritized Saturday physiotherapy services. The team is working collaboratively with 7.4 colleagues to ensure coverage needs and high priority care are addressed. Staff are moving around more to respond to the needs within our neurosciences group.

Other highlights and initiatives from 7.3 in 2018:

- Some staff attended the Atlantic Spinal Course, Injury Summit SCI by practitioners from around the Maritimes. This Summit was held in Fredericton, NB. The group is looking to host the next meeting in the Fall 2019.
- Planning capacity for three Masimo systems on the unit to be able to accommodate OSA patients post op.
- Planning for an electronic dashboard to assist with patient flow on the unit.

**Randi Monroe**



**Fran Kelloway**





# Clinical/Research Staff



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



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



**NICKY AYLES**  
RN  
Program RN:  
Neuromodulation



**SUSAN DOBBIN**  
RN  
Neurosurgery Clinic



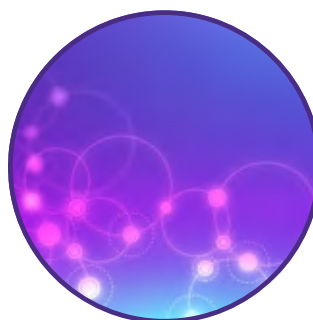
**ASHLEIGH BENTON**  
Research Coordinator:  
Neurosurgery Spine



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



**MISSY BRINSON**  
RN  
Brain Tumour Liaison Nurse



**MONA FOUDA**  
Health Services Manager:  
Neurosurgery Clinic

## Clinical / Research Staff (cont'd)



### **ALENA GALILEE**

**Research Associate:  
Neurotrauma/Simulation**



### **JUDITH JARRETT**

**RN, CCRP  
Program Coordinator:  
Cerebrovascular**



### **ANDREA L.O. HEBB**

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



### **LISA JULIEN**

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



### **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**

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



**SUSAN RAHEY**  
BSc, RET, RT(EMG)  
Program Coordinator:  
Epilepsy



**SUSAN MOORE**  
Research Assistant:  
Neurosurgery Spine



**SAMANTHA WARREN**  
Brain Tumour Liaison Nurse



**SARANYAN PILLAI**  
PhD  
Research Associate:  
Neurosurgery Spine



**RACHEL WOODMAN**  
Neurosurgery Clinic Aide



**CHRISTINE POTVIN**  
RN  
Program Coordinator:  
Neuromodulation

## Administrative Staff



**DEBBIE AMIRAULT**

Assistant to  
Dr. Sean Barry



**CATHY CARON**

Assistant to  
Dr. Daniel McNeely



**KATHARINE  
ANDERSON**

Assistant to  
Dr. Gwynedd Pickett



**MELISSA COOK**

Assistant to  
Dr. Sean Christie



**LORRAINE BELL-HILL**

Administrator  
Division of Neurosurgery



**PAM DOUCETTE**

Assistant to  
Dr. Lutz Weise





**EMMA GILLESPIE-FRASER**

Assistant to  
Dr. Adrienne Weeks



**KELLY MARTIN**

Executive Assistant  
to Dr. David Clarke



**DIANE JARDINE**

Assistant to  
Dr. David Clarke



**CHRISSY SHAY**

Assistant to  
Dr. Simon Walling



**MAUREEN KAY**

Assistant to  
Dr. Jacob Alant  
Neurosurgery Spine  
Referral Coordinator



**VALERIE WILSON**

Residency Program  
Administrator

# Neurosurgery OR Nurses

**JENNY BARNES SMITH**

**SAM CAMERON**

**JENNIFER DERENGOSKI**

**AMANDA GEORGE**

**JEN HOYT**

**ANNE JURCINA**

**DONNA MACQUEEN**

**DENYNE PARK**

**JESSICA TAYLOR**

**AMANDA WOODS**



# 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:** Ashleigh Benton

**Research Associates:** Nelofar Kureshi and Saranyan Pillai

**Research Assistants:** Sue Moore and Tanya Myers

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

## Accomplishments

- This year the Spine Program welcomes our third Dalhousie Spine Fellow, Dr. Ayoub Dakson, whom has just completed and passed his residency program with us. Welcome Dr. Dakson!
- The Atlantic Canada Spine meeting was held for the tenth consecutive year as a regional CME spine-focused event. The topic of focus was "Back to the future: Spine surgery in the next ten years." Dr. Stefan Parent, Dr. Raja Rampersuad, Dr. John Street, Dr. Hamilton Hall and Dr. John Hurlbert were this year's invited guest speakers. We thank Medtronic Canada for their continued support.

- OpNote is capturing spine operative data in a synoptic template for both Orthopedic Spine and Neurosurgery Spine Programs. Synoptic operative reports will standardize the clinical information captured by various surgeons and improve the quality of data captured compared to dictated reports.
- The SAVES form (Spine Adverse Events Severity System) for all spine surgeries is being implemented at NSHA.
- We are in the final stages of developing our Spine discharge note that will incorporate OpNote, laboratory and test results and adverse events. Stay tuned for implementation in 2019.
- Dr. Christie has completed his second year term as President of the Canadian Spine Society. He will step down as acting president in Feb 2019.
- In late November, our Spinal Cord Acute Services team – the first to be accredited in Canada – again received full national accreditation. Highlights of the accreditation report include clinical leadership, competency, episode of care, decision support and impact on outcomes. Congratulations to all of the Spine Team!

# Neurosurgery Spine Program (cont'd)

## Research

Spine program research projects include investigator-initiated and pharmaceutical driven studies, as well as multi-centre national and international studies.

- **Improving Patient Access to Spine Care Through Implementation of an Evidence-Based Spine Triage Clinic:** Support from our previous TRIC level 1 grant enabled a review of Neurosurgery spine referrals with wait times for first clinic visit (wait time 1) as a primary outcome of interest. Our findings from this review indicated that the mean wait time 1 was 188±235 days (excluding patients who had surgery on an urgent/emergent basis). This grant also identified key stakeholders across primary care, specialty care, ancillary services, and community members who agreed to participate in the ongoing development of the proposed spine triage model.
- **Trends and Regional Variations in Surgical Interventions for Spinal Degenerative Disorders in Canada:** This project evaluates the changing epidemiology of spinal degenerative diseases and rates of elective spinal surgeries in Canada from 2004-2015 in order to establish the trajectory of these entities and their economic impact on the Canadian healthcare system. Statistical analysis has been completed and this project is currently in the manuscript writing phase.
- **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 toward 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 in the manuscript writing phase.
- **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 disectomy 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 > 100ppb there may be health concerns. To date 27 out of 40 subjects have been enrolled.
- **Utility of the Spinal Instability Neoplastic Score (SINS) System in Surgical Practice:** A retrospective chart review of patients with spinal metastatic cancer to assess the Spinal Instability Neoplastic Score System (SINS) and its clinical utility in predicting surgical treatment decision is underway.
- **The Canadian Multicenter Cerebrospinal Fluid Pressure Monitoring and Biomarker (CAMPER) study** - a national multi-centre clinical trial examining spinal cord perfusion pressure (SCPP) in patients with acute SCI, as well as the effect of different vasopressor agents on SCPP. 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 through the Brain Canada MIRI competition. We have enrolled 15 patients into this project. The study is now ended and we are looking forward to CAMPER 2.
- This year marks our 11th 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 243 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 5th 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:
  - o Cervical Arthroplasty
  - o Cervical Myelopathy/Myeloradiculopathy
  - o Lumbar Spondylolisthesis

Currently, 214 patients have been included, 34 in 2018. 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) multicenter 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.
- Vertex: A Phase 2b/3, Double-blind, Randomized, Placebo-Controlled, Multicenter Study to Assess the Efficacy and safety of VX-210 in subjects with Acute Traumatic Cervical Spinal Cord Injury. This study is being done to learn more about 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. Approximately 150 patients in North America will be enrolled. The study ended in November 2018 and we enrolled two patients.
  - A Data-Driven e-Health Platform for Informed and Evidence-based Decision Making to Triage Spinal Surgeries: In collaboration Dr. Raza Abidi (Faculty of Computer Science, Dalhousie University), we have been awarded funding from CIHR Personalized Health Catalyst Grant to conduct this project.

- RESCUE-aSDH: a multi-centre, pragmatic, parallel group randomized trial comparing craniectomy vs. craniotomy for acute subdural hematoma patients. We have enrolled one patient into this study since starting in Dec 2018.
- Can we better predict long term success of permanent spinal cord stimulators? We were successful in receiving a grant from the NSHARF and will begin this study in Spring of 2019.

## Publications

Adams J, Hong M, **Christie S**, Barry S. (2018). Use of Intravenous Fluorescein for Intra-Operative Localization of an Intramedullary Spinal Cord Tumour; A Technical Note. Open Access Journal of Neurology & Neurosurgery, 7(3): 555711

Ayling OGS, Ailon T, McIntosh G, Soroceanu A, Hall H, Nataraj A, Bailey CS, **Christie S**, Stratton A, Ahn H, Johnson M, Paquet J, Thomas K, Manson N, Rampersaud YR, Fisher CG (2018). Clinical outcomes research in spine surgery: what are appropriate follow-up times? Neurosurgery Spine, 21: 1-8

**Christie SD**, Kureshi N, Beuprie I, Holness RO. (2018). Occipital osteomyelitis and epidural abscess after occipital nerve block: A case report. Canadian Journal of Pain, 2(1): 57-61

Morcos MW, Jiang F, McIntosh G, Johnson M, **Christie S**, Wai E, Ouellet J, Bailey C, Ahn H, Paquet J, Manson N, Fisher C, Rampersaud R, Thomas K, Hall H, Weber M. (2018). Predictors of Blood Transfusion in Posterior Lumbar Spinal Fusion: A Canadian Spine Outcome and Research Network Study. Spine, 43(1): E35-E39

Paquet J, Rivers CS, Kurban D, Finkelstein J, Tee JW, Noonan VK, Kwon BK, Hurlbert RJ, **Christie S**, Tsai EC, Ahn H, Drew B, Bailey CS, Fourny DR1, Attabib N, Johnson MG, Fehlings MG, Parent S, Dvorak MF. The impact of spine stability on cervical spinal cord injury with respect to demographics, management, and outcome: a prospective cohort from a national spinal cord injury registry. Spine, 18(1):88-98

Trenholm A, Xavier F, **Christie S**. Upper Extremity Pain: Where's the pathology -Neck or Shoulder? (2018). Journal of Current Clinical Care, 8(4): 21-33

Whelan A, Halpine M, **Christie SD**, McVeigh SA. (2018). Systematic review of melatonin levels in individuals with complete cervical spinal cord injury. J Spinal Cord Med, 22: 1-14

# Neurosurgery Spine Program (cont'd)

## Book Chapters

Chapter 21- Harms Technique for C1/C2 Fusion 2018/04/02 **Barry S, Brandman D.** 50 Landmark Papers Every Spine Surgeon Should Know (Vaccaro/Wilson/Fisher)

## Case Report

Case 23 \*New\* What the ... ?!?! **David Brandman / Sean Barry** Spinal Columns CSS newsletter Volume 18 Number 3, 44-45 August 2018

## Abstracts

Treatment of mild cervical myelopathy: which factors predict the decision for surgical intervention? M Bond, C Bailey, R Charest-Morin, **SD Christie**, N Manson, YR Rampersaud, CG Fisher, N Dea. Spine J 18(2018): S192 NASS/Los Angeles

Consultation and surgical wait times in patients with cervical spondylotic myelopathy: a prospective Canadian spine outcomes and research network (CSORN) study. Babak Sharifi, Charles G. Fisher, Bradley Jacobs, Christopher S. Bailey, **Sean D. Christie**, Raph le Charest-Morin, Kenneth Thomas, Raja Y. Rampersaud, Greg McIntosh, Nicolas Dea. Spine J 18(2018): S162 NASS/Los Angeles

Clinical outcomes research in spine surgery: what are appropriate follow-up times? Oliver G. S. Ayling, Tamir Ailon, Greg McIntosh, Alex Soroceanu, Hamilton Hall, Andrew Nataraj, Christopher S. Bailey, **Sean Christie**, Alexandra Stratton, Henry Ahn, Michael Johnson, Jerome Paquet, Kenneth Thomas, Neil Manson, Y. Raja Rampersaud and Charles G. Fisher. DOI: <https://doi.org/10.3171/2018.8.SPINE18715> AANS/New Orleans

Arthroplasty versus fusion surgery following anterior decompression -the Canadian experience. **Sean Christie**, Raja Rampersaud, Ken Thomas, Darren Roffey, Eugene Wai, Kim Vu. Canadian Journal of Surgery. 61(4):S89, Aug 2018 Canadian Spine Society Meeting

Traumatic cauda equina injury in Canada: What predicts neurological and bowel or bladder sphincter outcomes? Najmedden Attabib, Colleen O'Connell, Dilnur Kurban, Carly S. Rivers, Chris Bailey, **Sean Christie**, Karen Ethans, Heather Flett, Julio Furlan, Eve Tsai, RHSCIR Network, Amanda Carson. Canadian Journal of Surgery. 61(4):S85, Aug 2018 Canadian Spine Society Meeting, March 3, 2018

Epidemiology and outcomes of neck pain following surgery for cervical radiculopathy. **Fred Xavier, Ayoub Dakson**, Greg McIntosh, **Sean Christie**, CSORN Investigators. 2 Canadian Journal of Surgery. 61(4):S83, Aug 2018 Canadian Spine Society Meeting

Will cost transparency in the operating theatre cause surgeons to change their practice? R. Andrew Glennie, William Oxner, **Sean Barry, Jacob Alant, Sean Christie**. Canadian Journal of Surgery. 61(4):S83, AUG 2018. Canadian Spine Society Meeting

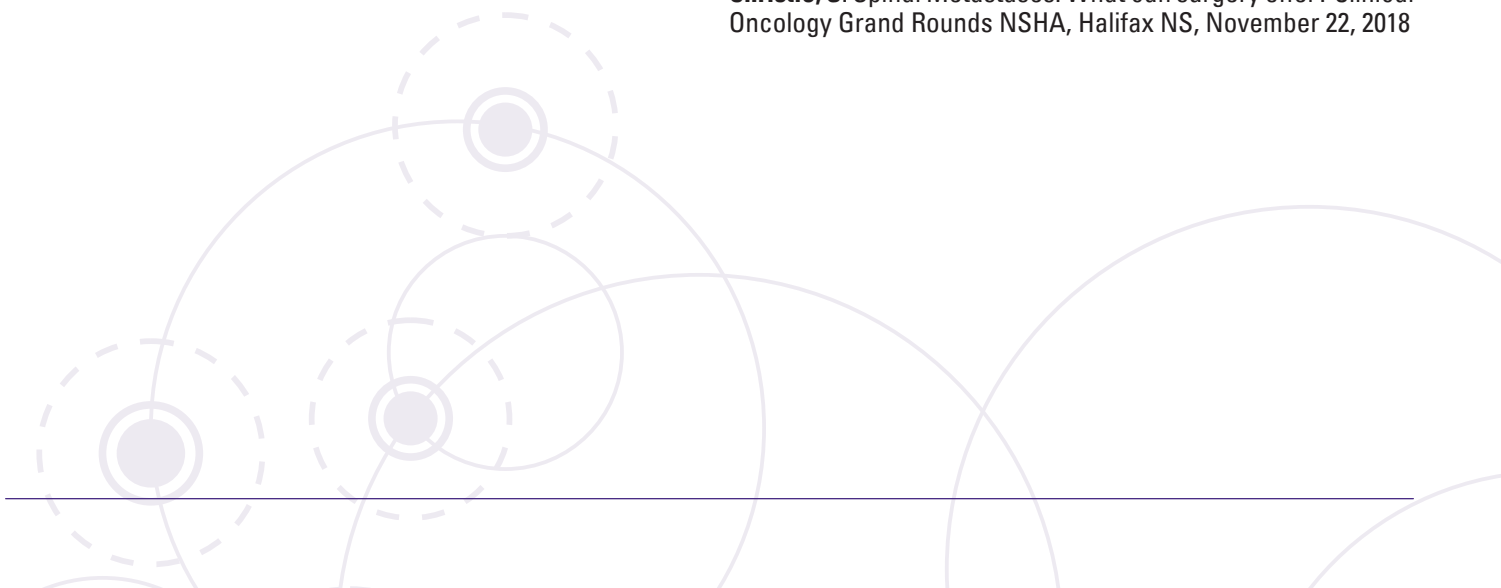
Spinopelvic parameters and sagittal balance does not correlate with baseline pain, function or general health in degenerative lumbar spondylolisthesis. Michael Staudt, Charles Fisher, Raja Rampersaud, Andrew Glennie, Ken Thomas, Raphaële Charest-Morin, Edward Abraham, **Sean Christie**, Nicolas Dea, Greg McIntosh, Jennifer Urquhart, Christopher Bailey. Can J Surg 61(4): S56, Aug 2018. Canadian Spine Society Meeting

## Invited Presentations / Lectures

**Barry, S.** "Will Cost Transparency in the Operating Theatre Cause Surgeons to Change Their Practice?" - Oral Presentation Euro Spine 2018 - Barcelona Spain - September 19-21, 2018

**Barry, S.** Will Cost Transparency in the Operating Theatre Cause Surgeons to Change Their Practice?" - Podium Presentation 18th Annual Scientific Conference of the CSS 2018 - Fairmont Banff Springs Alberta- August 23, 2018

**Christie, S.** Spinal Metastases: What can surgery offer? Clinical Oncology Grand Rounds NSHA, Halifax NS, November 22, 2018



**Christie, S.** Evolving Role for Acute Care in SCI Brain Repair Centre (visit from Rick Hansen) at NSHA, Halifax NS. October 26, 2018

**Christie, S.** Spinal Cord Injury: What will be different in 10 years? 10th Annual Atlantic Canadian Spine Meeting. Wallace NS, October 20, 2018

**Christie, S.** Spinal Cord Injury: Where do we go from here? Atlantic Mobility Action Project Annual Meeting, Whitepoint Lodge Resort, NS, October 2, 2018.

**Christie, S.** What is Spinal Balance All About? Canadian Neuroscience Federation, Halifax, NS, June 25, 2018

**Christie, S.** Innovation in the Neurosurgical OR: O-Arm and Spinal Navigation Canadian Neuroscience Federation, Halifax NS, June 25, 2018

**Christie, S.** MAP and Timing of Surgery in Traumatic Spinal Cord Injury. Canadian Orthopaedic Association, Victoria BC, June 23, 2018

**Christie, S.** Synergistic opportunities between the COA and CSS Canadian Orthopaedic Association, Victoria BC, June 20, 2018

**Christie, S.** Decision Making for Symptomatic but “Stable” Spinal Metastases Canadian Contemporary Spinal Techniques, May 26, 2018

**Christie, S.** Spinal Biomechanics, Decision Making and surgical Options in Degenerative Spine Disease, Ottawa Neurosurgery Review Course, Ottawa QC, Feb 8, 2018

**Christie, S.** Cervical Spondylosis: Diagnosis and Management, Ottawa Neurosurgery Review Course, Ottawa QC, Feb 8, 2018

## Funding/Grants

Rick Hansen Institute. Canadian Multicentre Cerebrospinal Fluid Pressure Monitoring and Biomarker Study. \$321,980 (2012-2018)

Rick Hansen Institute. Rick Hansen Spinal Cord Injury Registry. \$502,000 (2008-2018)

Medtronic of Canada, Ltd. Unrestricted research grant. \$40,000 (2018)

Vertex Pharmaceutical Inc.: \$62,479 (2017-2018)

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

NSHA- Research Fund Grant: \$25,000 (2018-2019)

## Team Members:

- Dr. Sean Christie, Neurosurgeon
- Dr. Jacob Alant, Neurosurgeon
- Dr. Sean Barry, Neurosurgeon
- Dr. Dan McNeely, Neurosurgeon
- Dr. Gwynedd Pickett, Neurosurgeon
- Dr. Simon Walling, Neurosurgeon
- Dr Lutz Weise, Neurosurgeon
- Angela Meagher, Nurse Practitioner
- Nelofar Kureshi, Research Associate
- Dr. Saranyan Pillai, Research Associate
- Lisa Julien, Research Coordinator, Program Team Lead
- Ashleigh Benton, Research Coordinator
- Sue Moore, Research Assistant
- Murray Hong, Neurosurgery OR
- Tanya Myers, Research Assistant
- Debbie Amirault, Administrative Support
- Melissa Cook, 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. Christine Short, NS Rehabilitation Centre
- Dr. Sonja McVeigh, NS Rehabilitation Centre
- Dr. Kate Montgomery, NS Rehabilitation Centre
- Dr. Mary Lynch, Pain Management Unit
- Dr. Ian Beuprie, Pain Management Unit
- Dr. Matthias Schmidt, Anesthesia
- Dr. Susan Morris, Neurophysiology

# 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 229 people with stimulators for movement disorders, and 229 with stimulators for pain.

The Neuromodulation Program provides coordinated patient care through Neurosurgery, Neurology and Anesthesiology. Deep Brain Stimulation (DBS) clinics provide a comprehensive assessment by Neurosurgery and Neurology for potential DBS candidates. DBS rounds allow Neurosurgery and Neurology to review and discuss treatment options for patients. Our Complex Pain Clinic patients are evaluated and a treatment plan is created by a Neurosurgeon and a complex pain Anesthesiologist.

With their consent, patient information including quality of life surveys and intraoperative microelectrode recording data are kept on 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 for "Correlation of tractography and motor evoked potentials in deep brain stimulation" and we enrolled 23 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 at local, national and international meetings:

- **Weise, L.** Influence of Disease Lateralization in Parkinson's disease on Fiber Tracking. Canadian Neuromodulation Society meeting. Whistler, BC February 4-6, 2018

## Team Members:

- Dr. Lutz Weise, Neurosurgeon
- Dr. Sean Christie, Neurosurgeon
- 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
- 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 Doucette, Administrative Assistant

## Off Site Collaborators:

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



**LEFT TO RIGHT:** N. Ayles, C. Potvin, R. Hill, Dr. L. Weise, P. Doucette



# 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 have access to a comprehensive service supported by the Divisions of Neurology and Neurosurgery, including:

- specialty outpatient clinics
- Neuropsychologist, 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 to selected patients in Newfoundland
- To continue to seek out innovative ways to continue to improve all aspects of service while working within the financial constraints of our health care system.

## Accomplishments

2018 saw service increases resulting from the expansion of the Epilepsy Monitoring Unit (from two beds to four), and a second epileptologist (Dr. Kristin Ikeda) and Neurosurgeon (Dr. Dan McNeely) joining the adult Epilepsy Program.

- There were 75 admissions to the Epilepsy Monitoring Unit (EMU). The expansion of the Unit allows for higher capacity and longer admissions as required.
- Included in the EMU admission total were 18 admissions for SEEG invasive recording (Phase II studies).
- Epilepsy surgical resection procedures were performed on 17 patients and three patients underwent etomidate speech and memory testing.
- More than 400 patient visits were registered in the various outpatient epilepsy clinics.

- Two EEG Technology students will be taking the national CBRET examinations in 2019. That, and the return of one staff from maternity leave later in 2019, will return EEG technology staffing to capacity.
- Dr. Stephanie Woodroffe completed focused training in Electroencephalography. She will take the Canadian Society of Clinical Neurophysiologists EEG Examination in June 2019.
- Dr. Ben Whatley began a two-year Fellowship in Epilepsy and Neurophysiology at the National Hospital for Neurology and Neurosurgery, Queen Square, in London, England. He is expected to return to Dalhousie and the QEII Health Sciences Centre in September 2020.
- A group of nurses interested in working in the EMU was identified, and advanced training provided in a full-day course offered by team members. These nurses are highly motivated to offer continuity of care to this unique patient population.
- EMU patients have created their own Facebook group, offering support and encouragement to one another.
- 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. Discussions of EMU cases, and the occasional outpatient case, are augmented by journal club.
- 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 or attending the display for purple cupcakes and education.
- We continue to benefit from the enthusiasm and commitment brought to the program by Residents assigned to the Epilepsy Program.

## Research

Team members are engaged in clinical research, including drug trials, neuropsychological profile development, 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.

# Surgical Epilepsy Program (cont'd)

## Team Members:

- Dr. Mark Sadler, Neurologist
- Dr. David Clarke, Neurosurgeon
- Dr. Dan McNeely, Neurosurgeon
- Dr. Kristin Ikeda, Neurologist
- Dr. Stephanie, Woodroffe, Neurologist
- Susan Rahey, Neurology, Program Coordinator
- Dr. Antonina Omisade, Neuropsychologist
- Dawnette Benedict-Thomas, Psychometrist
- Dr. Matthias Schmidt, Neuroradiologist
- Karen Legg, Neurology, Nurse Practitioner
- 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

## Celebration of Purple Day for Epilepsy Awareness



**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

**Program Manager:** Lynne Fenerty

**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.

As medical residency programs move towards competency-based training, simulation can provide an effective system for measuring and recording competencies in clinical knowledge and the development of surgical technical skills.

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.

## Goals

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

## 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.

## Research

- Virtual Reality (VR) Training for Neurosurgery Residents: PeriopSim™ VR versus PeriopSim™ iPad APP was tested at the 2018 Canadian Neurosurgery Rookie Camp. The PeriopSim™ VR provides fully immersive medical simulation surgical instrument training. The comparative study will analyze and compare the two different simulation platforms.

- Simulation Training for Perioperative Orthopedic Nurses using Digital Instrument Recognition (the PONDIR study) – effectiveness and health economic implications. In this study, which is led by Drs. Richard Hurley and David Clarke, participants will be recruited to determine the effectiveness of tablet-based simulation training for common orthopedic procedures.

## Presentations

**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. International Conference Residency Education, Halifax, NS, October 20, 2018.

## Invited Lectures

**Clarke DB** Nova Scotia Health Authority Annual General Meeting 2018, “Innovation in Training the Surgical Team – The Future is Now”, Halifax, NS, July 11, 2018.

## Funding/Grants

**\$370,000:** Biomedical Translational Imaging Centre (BIOTIC) R&D projects, Supporting the development and commercialization of neuro-based technologies. Funding provided by ACOAs Business Development Program, Government of Canada, QEII Foundation and Conquer Mobile, 2015-2018. Principal Investigator: **David B. Clarke**; Co-Investigators: Steven Beyea, Lauren Petley, Tim Bardouille, Denise Lalanne

## Team Members

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

## Team Collaborators

- Dr. Ryan D’Arcy, Department of Computing Science, Simon Fraser University
- Denise Lalanne, Biomedical Translational Imaging Centre (BIOTEC)
- Conquer Experience
- Dr. Richard Hurley, Orthopedic Surgery, Dartmouth General Hospital



# Cerebrovascular Program

**Director:** Dr. Gwynedd Pickett

**Coordinator:** Judith Jarrett

The Cerebrovascular Program is a multidisciplinary 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 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-center studies and local investigator driven studies as listed below. We maintain a number of databases that provide valuable information for local research endeavors.

## Ongoing Multi-Centre Studies

- **CURES** - The Canadian Unruptured Endovascular Coiling versus Surgical Clipping Trial, a randomized comparison of angiographic and clinical outcomes following treatment for Unruptured intracranial aneurysms. Currently enrolling, (Funding: \$6,000.00). Principal Investigator Dr. GE Pickett.
- **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. Currently enrolling, 15 subjects enrolled (Funding: \$33,547.00). Principal Investigator Dr. GE Pickett.

- **ESCAPE NA1** - A Multicenter, 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. Currently enrolling, 7 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). We have been accepted as a North American site and are in the REB approval process. (Funding: \$250,000.00). Principal Investigator Dr. GE Pickett.

## Ongoing Local Studies

**3D Printed Models:** Can they assist with Information Transfer and Satisfaction when treating Intracranial Aneurysms  
Co-Principal Investigators Dr. A Weeks, Dr. GE Pickett.

**Clinical outcomes and imaging features of SILK flow diverters and parent artery occlusion for treatment of complex aneurysms at QEII**  
Principal Investigator Dr. GE Pickett.

**Evaluation of the Unruptured Intracranial Aneurysm Treatment Score: how does it compare with treatment decisions made by a multidisciplinary 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. Thien Huynh joined the Department of Radiology in September 2018, performing both diagnostic and interventional neuroradiology, as well as bringing a keen interest in research.
- 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.



## 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 is in the process of acquiring Novalis Certified status. This dedicated accreditation program ensures a high standard in patient safety and treatment quality for SRS. To date, 42 centres have been certified worldwide; Halifax will be the first Canadian centre to achieve this recognition.

## Presentations and Invited Lectures

**Pickett GE.** Pathophysiology, Diagnosis and Management of Vasospasm. Ottawa Review Course, Ottawa, Ontario, February 2018.

**Pickett GE.** The Brain: Our Inner World. Museum of Natural History, Halifax, Nova Scotia, February 2018.

**Pickett GE.** Opening Pandora's Box: Risk, Uncertainty and Decision Making in Cerebrovascular Neurosurgery. Canadian Association of Neurological Nurses annual meeting, Halifax, Nova Scotia, June 2018.

**Pickett GE.** Stereotactic Radiosurgery for Skull Base Lesions. 53rd Congress of the Canadian Neurological Sciences Federation, Halifax, Nova Scotia, June 2018.

**Weeks AC.** Carotid Stenosis for Primary Care. Atlantic Stroke Conference, Halifax, Nova Scotia, October 2018.

**Pickett GE.** Decompressive Hemi-Craniectomy for Stroke. Atlantic Stroke Conference, Halifax, Nova Scotia, October 2018.

## Posters

MacMillan S, Vandervelde C, Knapman J, Hesser K, Gorman J, Lapierre M, Ryckborst K, Kenney C, **Jarrett J**, Wright M. Development of a Canadian Stroke Research Coordinator Team to enhance research capacity. 11th World Stroke Congress, Montreal, Canada, October 2018.

## 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 Vantorpe, Neuroradiologist
- Dr. Matthias Schmidt, Neuroradiologist
- Dr. Jai Shankar, Neuroradiologist
- Dr. Jens Heidenreich, Neuroradiologist
- Dr. Thien Huynh, Neuroradiologist
- Katharine Anderson, Administrative Assistant
- Emma Gillespie-Fraser, Administrative Assistant



**BACK (LEFT TO RIGHT):** Dr. A. Weeks, Dr. L. Green, Dr. S. Phillips, Dr. M. Schmidt, J. Jarrett  
**FRONT (LEFT TO RIGHT):** 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:** Missy Brinson/  
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 hold meetings every 2nd Tuesday of each month at:

The Lodge That Gives,  
5826 South Street  
Halifax, NS

The New Glasgow Group hold 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-nova-scotia#sthash.TwDcHPLw.dpuf>

Our prospective epidemiology Brain Tumour Database continues with over 4300 patients currently entered.

## Research

Dr. Adrienne Weeks and Dr. Sid Croul, in coordination with the Divisions of Neurosurgery and Pathology, started the Nova Scotia Brain Tumour Bank to aid in future research.

Dr. Simon Walling, Dr. Conrad Fernandez (IWK), Dr. Adrienne Weeks, Dr. Dan McNeely and Andrea Hebb, (Local Associate Investigators) are part of a collaborative research team led by Dr. Nada Jabado at McGill University/McGill University Health Center (Genome Canada). "Biomarkers for Pediatric and Adult High Grade Astrocytoma through Genomics and Epigenomics" is a Canada wide study for adult patients under the age of 50 and children, and their families, surveying their thoughts surrounding receiving genetic research results.

A sub-study of this grant involves collecting tumour samples in patients with high grade astrocytoma, with the formation of human tumour cell lines, in the laboratory of Drs. Adrienne Weeks and Simon Walling and co-investigators Dr. David Clarke, Dr. Dan McNeely and Andrea Hebb in collaboration with Dr. Sidney Croul, Neuropathology.

Dr. Weeks and her Masters of Science student, Liam Rappoldt, are working on establishing better models of brain cancer using patient-derived organotypic models. Hopefully these models will provide a new method of testing novel therapeutic strategies.

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 component of the brain cancer's pro-survival stress response called stress granules as a means of overcoming treatment resistance and improving patient outcomes in brain cancer.

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

In collaboration with the Division of Pediatric Neurosurgery, British Columbia's Children Hospital and Division of Neurosurgery, Department of Surgery, University of British Columbia and members of the Vancouver Pediatric Neurosurgery Study Group, Dr. Simon Walling and Dr. Dan McNeely (Local Associate Investigators) are participating in a nationwide study "Mutism After Posterior Fossa Tumour Resection in Children: A Multi-centered International Retrospective Study" to identify factors related to the overall management or surgical technique that correlate with a lower or higher incidence of Cerebellar mutism syndrome (CMS).

The Maritime Provinces are working together to establish a collaboration within sites to promote brain cancer research. This effort will be led by Dr. Adrienne Weeks (Halifax), Dr. Dhany Charest (Moncton), Dr. Mary McNeil (Halifax), Dr. Liam Mulroy (Halifax) and Dr. Sid Croul (Halifax). We are looking forward to our first Atlantic Brain Cancer Meeting in 2019.

Basic Science Brain Tumour Research: see Brain Tumour Laboratory, Dr. Adrienne Weeks.

## Accomplishments

- The 2nd Annual Brain Cancer Bash raised over a quarter of a million dollars for brain cancer research in Nova Scotia. A generous donation of \$250 000 was received from Lori Duggan and Garry Beattie. Donations can be made to through the QE II Foundation.
- Dr. Kathleen Atwood won best basic science prize in the Department of Surgery Research Day for her work in targeting stress granules in brain cancer.
- **Brain Tumour Bank:** This Nervous System Tumour Tissue Bank now contains over 80 samples of brain tumours including astrocytomas, meningiomas, schwannomas and metastases. Dr. Weeks and Dr. Croul would like to extend thanks to our very generous patients in donating samples for research.

## Conferences

Dr. Weeks attended the Canadian Neuro-Oncology meeting in Banff, Alberta to highlight the work on stress granules in brain cancer.

## 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
- Missy Brinson, Neurosurgery Brain Tumour Nurse Coordinator
- 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. Jai Shankar, Neuroradiologist
- Dr. Robert Vandorpe, 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. Vandorpe, 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

**Program Manager:** Lynne Fenerty

**Research Coordinator:** Lorelei Audas

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

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 3 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 program is 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 national meetings.

## Research

- TBI database: TBI admissions to Neurosurgery are reviewed at TBI teaching and quality rounds, chaired by Dr. Clarke. Currently, over 2,475 cases have been reviewed for inclusion in the TBI database.
- “Breaking the Vicious Cycle of Addiction and Impaired Driving” a study designed to evaluate the effectiveness of linking drivers who are injured in an motor vehicle crash (MVC) and hospitalized for trauma, and who screen positive for alcohol and/or illicit drug use with inpatient addiction consult services. Our objective is to study the effect of this bridging program on the uptake of outpatient addiction services, and reduction in health care utilization.
- “The investigation of the incidence and economic burden of alcohol-related traumatic brain injury in Nova Scotia”, a joint partnership with the Department of Health and Wellness and the Nova Scotia Trauma Program, has been completed and is in manuscript preparation.
- “A National Biobank and Database for Patients with Traumatic Brain Injury”, the CanTBI study has enrolled 20 participants.
- “Microvascular injury and the blood brain barrier dysfunction as novel biomarkers and targets for treatment in traumatic brain injury”. This study has received research ethics approval and is currently recruiting patients.

## Publications

Kureshi N, Clarke DB. Neurotrauma Research at Dalhousie University: A Snapshot Past and Present Developments. Spotlight on Canadian Neurotrauma Res. Journal of Neurotrauma, 35(16):1986-2004, 2018.



## Funding and Grants

**\$3 Million:** 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. Primary Investigator: Jamie Hutchison (University of Toronto); Co-Investigators: Andrew Baker, Karen Barlow, **David B. Clarke**, Michael Esser, Robin Green, Anne-Marie Guerguerian, Jacques Lacroix, Alain Ptito, Keith Walley, Jamie Hutchison.

**\$237,050:** CIHR Project Grant. Microvascular injury and the blood brain barrier dysfunction as novel biomarkers and targets for treatment in traumatic brain injury. Primary Investigator Dr. Alon Friedman; Clinical Principal Investigator **Dr. David B. Clarke**, Co-Investigators **Dr. Simon Walling**, Dr. Robert Green, Dr. Christopher Bowen, Dr. Matthias Schmidt

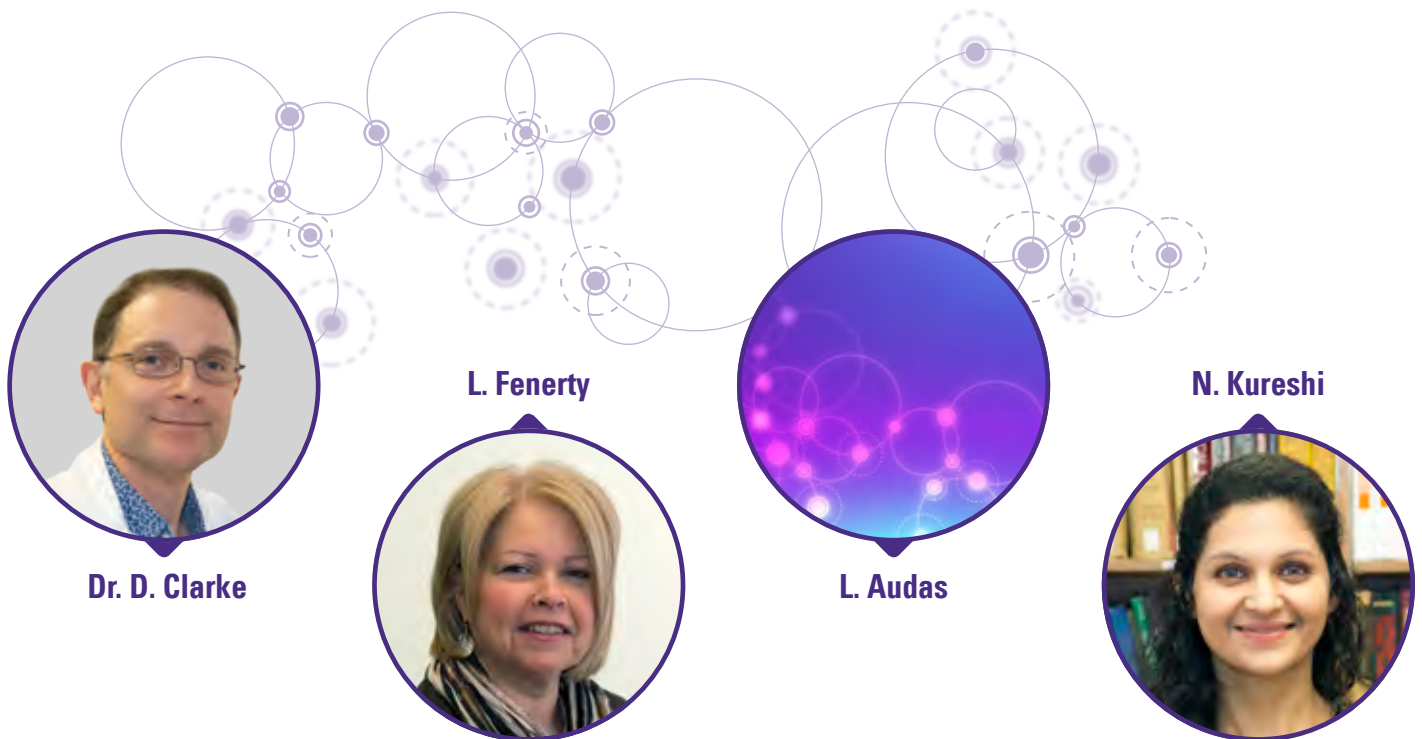
**\$20,000:** Department of Health Promotion and Protection. An Investigation of the Health and Economic Outcomes of Alcohol-Related Traumatic Brain Injury in Nova Scotia. **David B. Clarke**, **Simon Walling**, Robert Green, Lynne Fenerty, Nelofar Kureshi, Mete Erdogan, Ginette Thibault-Halman

## Team Members:

- Dr. David Clarke, Neurosurgeon
- Dr. Simon Walling, Neurosurgeon
- Lynne Fenerty, Program Manager
- Lorelei Audas, Research Coordinator
- Nelofar Kureshi, Research Associate
- Coralea Carey, Research Assistant

## 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



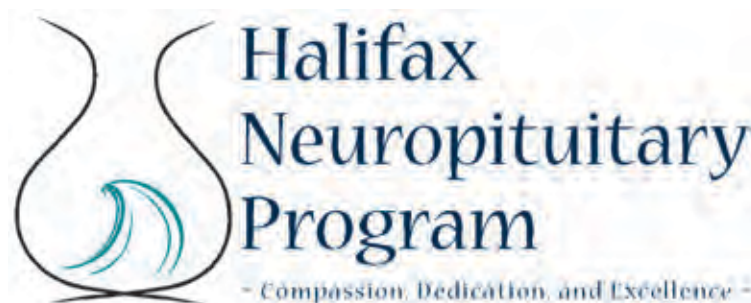
**Dr. D. Clarke**

**L. Fenerty**

**L. Audas**

**N. Kureshi**

# 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.

## Program Summary/Overview

The Halifax Neuropituitary Program (HNP), unique to the Atlantic Provinces and much of Canada, provides comprehensive care to over 1800 patients with pituitary and sellar region tumours in a multidisciplinary 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 multidisciplinary teleconference rounds are held with external sites from Nova Scotia, New Brunswick and PEI.

Our program referrals continue with 50 new HNP surgical referrals, to include Prince Edward Island (n=1), Alberta (n=1), New Brunswick (n=12) and Nova Scotia (n=36) and 107 new HNP medical referrals, to include Prince Edward Island (n=2), Alberta (n=1), New Brunswick (n=2), Ontario (n=6) and Nova Scotia (n=96) representing a consistent number of new patient referrals from previous years.

There were 373 patient visits to the HNP medical clinic and 350 patient visits to the HNP surgical clinic in 2018.

Twenty-nine transsphenoidal surgeries were performed endoscopically in 2018 by Drs. Clarke (Neurosurgery) and Massoud (Otolaryngology).

In addition, we have treated our 14th patient, as part of our Health Canada approved clinical trial on the stereotactic intracavitary instillation of 90yttrium for treatment of cystic sellar/parasellar lesions. Dr. Clarke is the principal investigator on this clinical trial which is being performed in collaboration with Dr. Steven Burrell and Dr. George Mawko in the Department of Diagnostic Imaging QEII Health Sciences Centre.

Our entire team was profoundly saddened by the sudden death of our friend and colleague Dr. Angela McGibbon. She is missed by all who were fortunate enough to know her.

## Publications

1: Vaninetti NM, Clarke DB, Zwicker DA, Yip CE, Tugwell B, Doucette S, Theriault C, Aldahmani K, Imran SA. A comparative, population-based analysis of pituitary incidentalomas vs clinically manifesting sellar masses. *Endocr Connect*. 2018 May; 7(5):768-776.

2: Elnenaei M, Minney D, Clarke DB, Kumar-Misir A, Imran SA. Reflex and reflective testing strategies for early detection of pituitary dysfunction. *Clin Biochem*. 2018 Apr; 54:78-84.

3: Imran SA, Aldahmani KA, Penney L, Croul SE, Clarke DB, Collier DM, Iacovazzo D, Korbonits M. Unusual AIP mutation and phenocopy in the family of a young patient with acromegalic gigantism. *Endocrinol Diabetes Metab Case Rep*. 2018 Feb 9; 2018.

4: Munro V, Elnenaei M, Doucette S, Clarke DB, Imran SA. The effect of time of day testing and utility of 30 and 60 minute cortisol values in the 250 mcg ACTH stimulation test. *Clin Biochem*. 2018 Apr; 54:37-41.

## Education

### Invited Speakers

Drs. Clarke and Imran along with Lisa Tramble RN, presented at the Acromegaly Awareness Day, November 1, 2018. <http://thechronicleherald.ca/halifaxcitizen/1530358-sleep-apnea-key-symptom-of-rare-disease>

Lisa Tramble, RN organized the Acromegaly Support Group biannual meetings in the Spring and Fall, 2017, as well as the Cushing Support Group in the Fall, 2017.

### Poster presentations

Clarke, D., Hebb, A., Massoud, E., & Imran, S. (2018). P.039 In-hospital endocrinology consultation in post-operative pituitary surgery: Is it necessary? *Canadian Journal of Neurological Sciences / Journal Canadien Des Sciences Neurologiques*, 45(S2), S26-S26. doi:10.1017/cjn.2018.141. 53rd Congress of the Canadian Neurological Sciences Federation (CNSF) Halifax, NS June 24-27, 2018

Massoud, E., Hebb, A., & Clarke, D. (2018). P.036 Securing the nasoseptal flap in endoscopic transsphenoidal surgery: No Foley catheter needed! *Canadian Journal of Neurological Sciences / Journal Canadien Des Sciences Neurologiques*, 45(S2), S25-S25. doi:10.1017/cjn.2018.138. 53rd Congress of the Canadian Neurological Sciences Federation (CNSF) Halifax, NS June 24-27, 2018

Vaninetti, N., Mustafa, S., Doucette, S., Glasgow, R., Tramble, L., Hebb, A., Imran, S.A., Clarke\*, D. (2018). P.040 New-onset secondary hormone deficiency in patients with incidental versus clinically manifesting sellar masses. *Canadian Journal of Neurological Sciences / Journal Canadien Des Sciences Neurologiques*, 45(S2), S26-S26. doi:10.1017/cjn.2018.142. 53rd Congress of the Canadian Neurological Sciences Federation (CNSF) Halifax, NS June 24-27, 2018

### 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, 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 and treated 14 patients.

# Halifax Neuropituitary Program (cont'd)

## Team Members:

- Dr. David Clarke, Neurosurgeon
- Dr. Ali Imran, Endocrinologist
- Dr. Emad Massoud, Otolaryngologist
- Raven Glasgow, Program Clinic Coordinator
- Andrea Hebb, Neurosurgery Research Coordinator
- Lisa Tramble, Endocrinology Clinic Nurse
- Diane Jardine, Administrative Assistant
- Murray Hong, Neurosurgery OR Technologist
- Dr. Aditya Mishra, Ophthalmologist
- Dr. Janice Ho, Endocrinologist
- Dr. Deborah Zwicker, Endocrinologist- Sydney, NS
- Dr. Vicki Munro, Endocrinologist – Saint John, NB
- Dr. Angela McGibbon, Endocrinologist, Fredericton, NB
- 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

## The Stereotactic Radiosurgery Group

- Dr. Liam Mulroy (Radiation Oncologist)

## Team Collaborators:

- Diagnostic Imaging
- Nova Scotia Eye Centre



**BACK ROW:** Dr. D. Clarke, A. Hebb, Dr. A Imran, R. Glasgow, Dr. D. Zwicker

**FRONT ROW:** 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  
**Clinic Coordinators:** Bonita Meade



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 (NF2) is a hereditary condition (autosomal dominant, spontaneous and mosaic) most commonly associated with bilateral vestibular schwannomas. NF2 Clinics continue to be held 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.

Dr. Nael Shoman joined the program in 2018 as Dr. Manohar Bance left the Skull Base Clinic (SBC) to pursue other professional opportunities in the United Kingdom. Our program referrals have increased since 2017, with 79 new Maritime Lateral SBC referrals, to include 28 patients from New Brunswick, eight patients from PEI, one patient from NL and 42 from NS. Over 500 clinic visits occurred in 2018. Dr. Simon Walling performed 18 surgeries (10 with Dr. David P. Morris and Dr. Nael Shoman) including one pediatric patient to remove CPA tumours in 2018.

In addition, 23 patients underwent stereotactic radiation therapy (SRT) to control tumour growth.

# Maritime Lateral Skull Base Program (cont'd)

## Program Goals

- To offer a single centre, multidisciplinary 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: Questionnaires 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.

## Publications

Graham ME, Westerberg BD, Lea J, Hong P, Walling S, Morris DP, Hebb ALO, Galletto R, Papsin E, Mulroy M, Foggin H, Bance M. Shared decision making and decisional conflict in the Management of Vestibular Schwannoma: a prospective cohort study. *J Otolaryngol Head Neck Surg.* 2018 Sep 3; 47(1):52.

Davenport SA, Hebb ALO. Otoacoustic Emissions: An Invaluable Screen of Neonatal Hearing. *Ann Otolaryngol Rhinol.* 2018 5(5): 1222.

Hebb ALO, Mackenzie L, Wade H. Hearing Loss in Children. *LOJ Nur Heal Car* 2(1)-2018. LOJNHC.MS.ID.000126. DOI: 10.32474/ LOJNHC.2018.02.000126.

Hebb ALO, Erjavec, N., Morris DP, Mulroy M, 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.* 2018 Nov 22. pii: S0196-0709(18)30987-6. doi: 10.1016/j.amjoto.2018.11.004. [Epub ahead of print]

## Team Members:

- Dr. Simon Walling, Neurosurgeon
- Dr. Manohar Bance, Otolaryngologist
- Dr. David P. Morris, Otolaryngologist
- Andrea Hebb, Research Coordinator
- Bonita Meade, Clinic Coordinator
- Keri Sampson, Clinic Coordinator

## The Stereotactic Radiosurgery Team:

- Dr. Liam Mulroy, Radiation Oncology
- Mark Gulliver, Audiologist
- Dr. Marie Earl, Dalhousie University School of Physiotherapy
- Maritime Medical Genetics, IWK Health Centre

# 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 grow. The aim of the Neurosurgery Kids Fund is to support activities that enhance the quality of life of pediatric patients who have undergone neurosurgical treatment. Other goals are to support pediatric neurosurgery educational and research activities. We are grateful to the many benefactors who have donated their money, time, and energy towards sustaining this endeavor.

This year, the Neurosurgery Kids Fund held its first ever afternoon at the Discovery Centre in Halifax on April 22, 2018. This event was free to all pediatric patients who have undergone neurosurgical treatment, and was very well attended. Our first ever week-long Neurosurgery Kids Camp also occurred this year, in July 2018 at Brigadoon Village in Aylesford, NS. We thank the Brigadoon Staff who ensured that the camp ran smoothly.

## Team Members and Collaborators:

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

Dr. S. Walling



Dr. D. McNeely



IWK Health Centre

# Neurosurgery OR Report

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

The OR group has made Neurosurgery an institutional leader in OR efficiency. We are continually updating our imaging capabilities. We are acquiring the latest in neuronavigation equipment and are the first unit in the country to acquire the latest O-arm intra-operative CT scanning technology. These investments are critical in supporting our busy service.

For our Neuromodulation Program, the MER system with the Alpha Omega Neuro Omega enables a more streamlined and efficient surgical flow as well as expanded research capabilities. Online statistics including evoked potentials, firing rates and raster graphs assist in more accurate and fast analysis of MER recordings and surgical decision-making.

We continue to utilize fMRI and have included MEG functional maps, merged with MR and PET on the OR Image-Guided work stations. These maps allow better localization for intra-operative mapping and resection for both tumour and epilepsy surgeries.

To supplement our image guidance with MR, CT and PET, DTI scans are loaded into the StealthViz software application (Medtronic Navigation, Louisville, CO) for fiber tracking to better understand the connecting pathways. These tracks are overlaid on various merged image sequences that can then be used for intra-operative navigation.

Work continues on the Virtual Reality (VR) module for interactive training between residents and nurses. This module continues to use the HTC VIVE 3D VR headset that we have used for our Burrhole procedure.

Intraoperative 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 intraoperative intervention and avoidance of post-operative deficits such as paralysis. Neurosurgeries that may benefit from IONM include brain, brainstem and spinal cord tumour resections and complex spine deformity corrections.

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 intraoperative neuromonitoring methods and develop new techniques to optimize patient safety during spine surgery.

R. Hill

S. Morris

M. Hong





# Neurosurgery Basic Science Labs

Life Sciences Research Institute (LSRI)

Brain Repair Centre (BRC)

## Spinal Cord Injury Laboratory

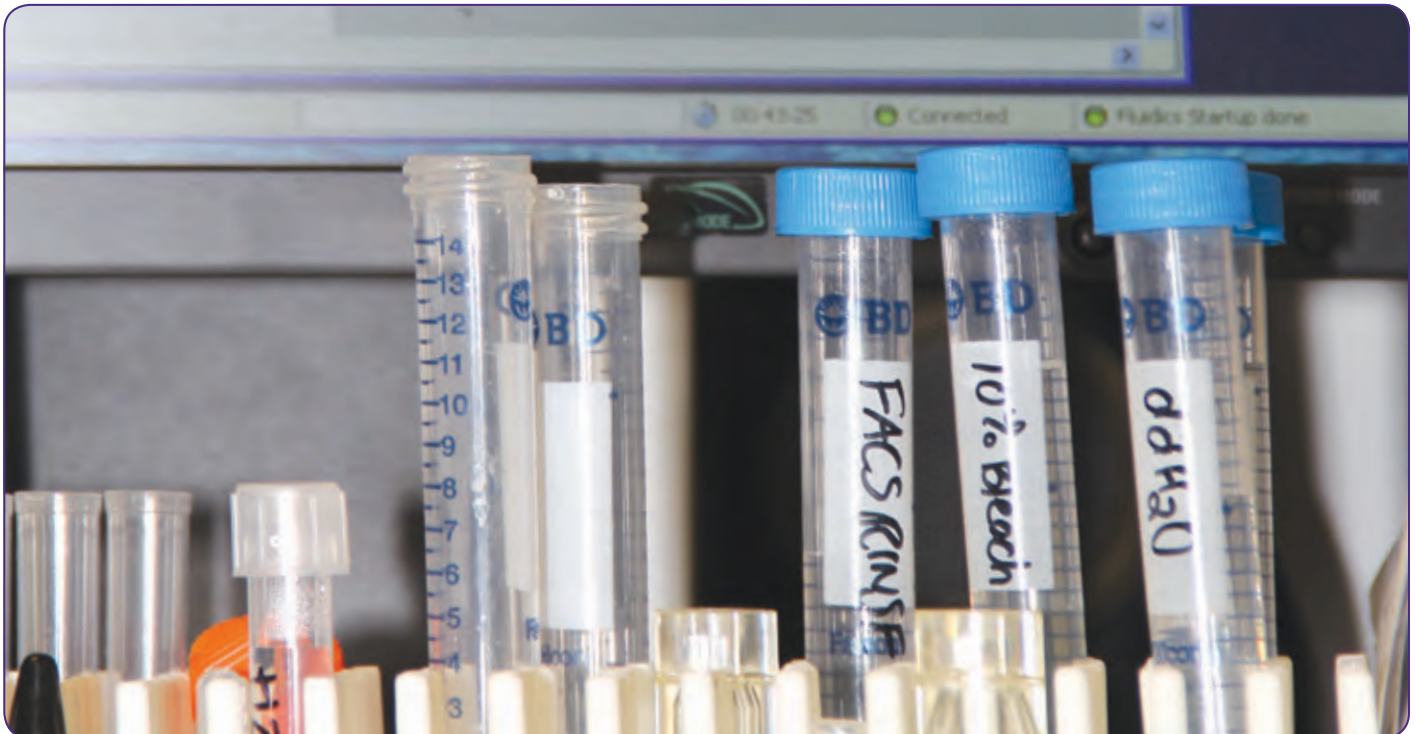
### Dr. Sean Christie

The Christie Lab is working towards a better understanding of the molecular and subcellular events that follow spinal cord injury.

One arm of this research is following the microRNA changes that occur, influencing several genes that may aggravate the injury. MicroRNA are molecular switches controlling numerous downstream effects. Mustafa Nadi is working on this research for his PhD thesis.

Another arm of research follows the dynamics of the mitochondria in neurons and glia after spinal cord injury and treatment. The number and health of these organelles in neurons and support cells are vital for survival and repair after spinal cord injury. We are experimenting with ways of improving the number of mitochondria after injury. Mackenzie Cook is working on this research for her Honors Thesis in Neuroscience.

We are interested in discovering new treatments for spinal cord injury. The Christie Lab was successful in the Brain Repair Centre Knowledge Translation Grant 2018 competition and was awarded \$30,000 to test our proposed treatment for spinal cord injury. Experiments are underway studying this promising treatment which could prevent the expansion of secondary spinal cord injury. Dr. Saranyan Pillai, Research Coordinator-Analyst, administers the scientific research, trains lab members and contributes hands-on to these projects whenever possible.



## Neurosurgery Basic Science Labs (cont'd)

### Brain Tumour Laboratory

#### Dr. Adrienne Weeks

Dr. Weeks and her MSc. Student Liam Rappoldt are working on establishing better models of brain cancer using patient derived organotypic models. Hopefully these models will provide a new method of testing novel therapeutic strategies.

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 component of the brain cancer's pro-survival stress response called stress granules as a means of overcoming treatment resistance and improving patient outcomes in brain cancer.

Dr. Adrienne Weeks and Dr. Sid 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 including astrocytomas, meningiomas, schwannomas and metastases. Dr. Adrienne Weeks and Dr. Sid Croul are very grateful for the generosity of patients donating samples for research.

A sub-study of this grant involves collecting tumour samples in patients with high grade astrocytoma, with the formation of human tumour cell lines in the basic science laboratory of Drs. Adrienne Weeks and Simon Walling and co-investigators Dr. David Clarke, Dr. Dan McNeely and Andrea Hebb, in collaboration with Dr. Sidney Croul, Neuropathology.

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



# Neurosurgery Research Funding

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)  
 Funding over four years  
 2015-2019  
 \$1,824,513

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

Principal Investigator: **David B. Clarke**  
 Co-Investigators: Steven Beyea, Lauren Petley, Tim Bardouille, Denise Lalanne  
 ACOAs Business Development Program, Government of Canada, QEII Foundation and Conquer Mobile, Biomedical Translational Imaging Centre (BIOTIC) R&D projects, Supporting the development and commercialization of neuro-based technologies  
 2015-2018  
 \$370,000

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

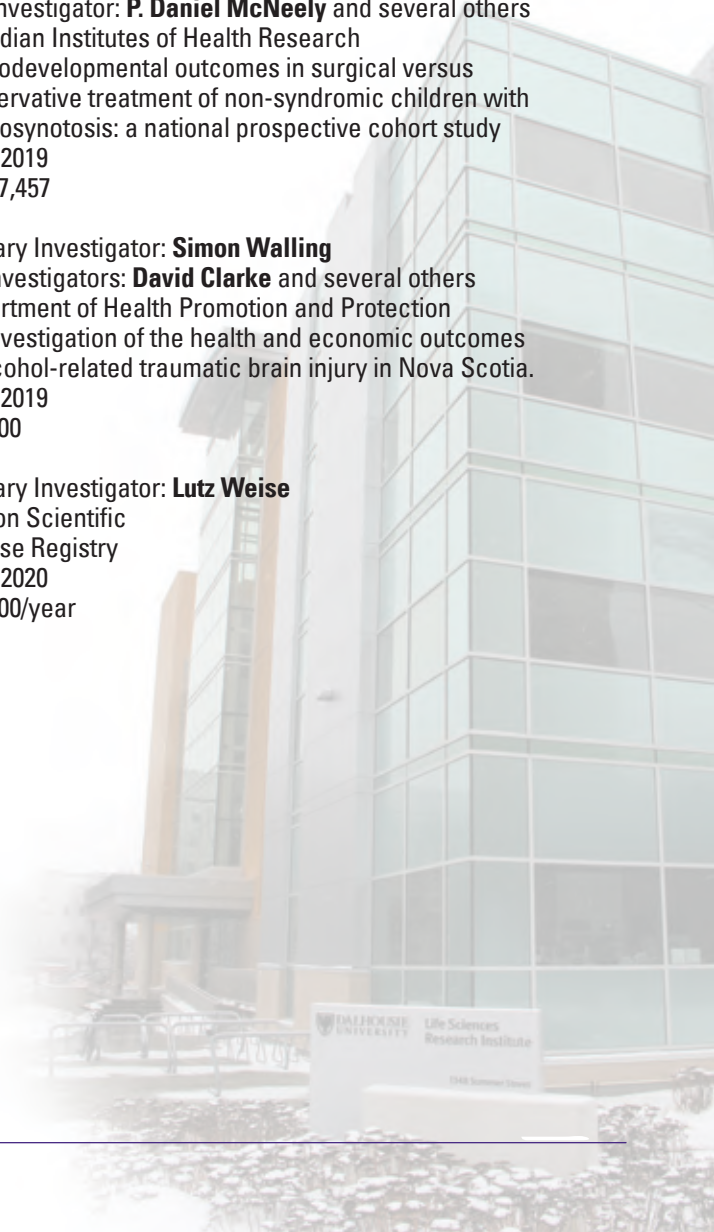
Principal Investigator: **Sean Christie**  
 Brain Repair Centre: Knowledge Translation Grant  
 Time is Spine: Minimizing Secondary Spinal Cord Injury by Hyper-Acute Delivery of a Combination of Pleiotropic Neuroprotectants  
 2018-2019  
 \$30,000

Principal Investigator: **Sean Christie**  
 NSHARF  
 Can we better predict long term success of permanent spinal cord stimulators?  
 2018-2019  
 \$25,000

Principal Investigator: Jay Riva  
 Co- Investigator: **P. Daniel McNeely** and several others  
 Canadian Institutes of Health Research  
 Neurodevelopmental outcomes in surgical versus conservative treatment of non-syndromic children with craniosynostosis: a national prospective cohort study  
 2018-2019  
 \$1,867,457

Primary Investigator: **Simon Walling**  
 Co-Investigators: **David Clarke** and several others  
 Department of Health Promotion and Protection  
 An Investigation of the health and economic outcomes of alcohol-related traumatic brain injury in Nova Scotia.  
 2018-2019  
 \$20,000

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





# Publications

**Adams J, Hong M, Christie S, Barry S.** Use of Intravenous Fluorescein for Intra-Operative Localization of an Intramedullary Spinal Cord Tumour; A Technical Note. *Open Access Journal of Neurology & Neurosurgery*, 7(3): 555711, 2018.

**Ali M, McNeely PD.** Junctional Neural Tube Defect: A Supporting Case Report. *Child's Nervous System*, 34:1447-1448, 2018.

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**Clarke DB, Kureshi, N.** Neurotrauma Research at Dalhousie University: A Snapshot Past and Present Developments. *Spotlight on Canadian Neurotrauma Research. Journal of Neurotrauma*, 35(16):1986-2004, 2018.

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**Imran SA, Aldahmani KA, Penney L, Croul SE, Clarke DB, Collier DM, Iacovazzo D, Korbonits M.** Unusual AIP Mutation and Phenocopy in the Family of a Young Patient with Acromegalic Gigantism. *Endocrinology Diabetes Metabolism Case Report*, Vol 2018 (1), Feb 2018.

**Maclean MA, Easton AS, Pickett GE.** Focal Cortical Dysplasia Type IIIb with Oligodendroglioma in a Seizure-Free Patient. *Canadian Journal of Neurological Sciences*, 12:1-3, Feb 2018.

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## Books and Chapters

**Barry S, Brandman D.** 50 Landmark Papers Every Spine Surgeon Should Know (Vaccaro/Wilson/Fisher). Chapter 21- Harms Technique for C1/C2 Fusion. *ISN April 2, 2018.*

**Dakson A, Hong, Murray, Clarke DB.** Virtual Reality Surgical Simulation: Implications for Resection of Intracranial Gliomas. *Progress In Neurological Surgery, Intracranial Gliomas, Part I Surgery*, Vol 30, Page 106-116, 2018.



# Presentations

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Ayling OGS, Ailon T, McIntosh G, Soroceanu A, Hall H, Nataraj A, Bailey CS, **Christie SD**, Stratton A, Ahn H, Johnson M, Paquet J, Thomas K, Manson N, Rampersaud YR, Fisher CG. "Clinical Outcomes Research in Spine Surgery: What are Appropriate Follow-Up Times?" AANS, New Orleans, SPINE18715, 2018.

**Barry S**. "Will Cost Transparency in the Operating Theatre Cause Surgeons to Change Their Practice?" Podium Presentation, 18th Annual Scientific Conference of the CSS 2018. Fairmont, Banff Springs Alberta. 2018.

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Bond M, Bailey C, Charest-Morin R, **Christie SD**, Manson N, Rampersaud YR, Fisher CG, Dea N. "Treatment of Mild Cervical Myelopathy: Which Factors Predict the Decision for Surgical Intervention?" Spine J 18(2018): S192 Nass/Los Angeles, 2018.

**Christie SD**. "Arthroplasty versus Fusion Surgery Following Anterior Decompression the Canadian Experience." Canadian Spine Society Meeting. Canadian Journal of Surgery. 61(4):S89, Aug 2018.

**Christie SD**. "Epidemiology and Outcomes of Neck Pain Following Surgery for Cervical Radiculopathy. Canadian Spine Society Meeting. Canadian Journal of Surgery. 61(4):S83, Aug 2018.

**Christie SD**. "Spinopelvic Parameters and Sagittal Balance does not Correlate with Baseline Pain, Function or General Health in Degenerative Lumbar Spondylolisthesis." Canadian Spine Society Meeting. Canadian Journal of Surgery. 61(4): S56, Aug 2018.

**Christie SD**. "Traumatic Cauda Equina Injury in Canada: What Predicts Neurological and Bowel or Bladder Sphincter Outcomes?" Canadian Spine Society Meeting. Canadian Journal of Surgery. 61(4):S85, Aug 2018.

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**Clarke D, Hebb A**, Massoud E, Imran SA. "In-Hospital Endocrinology Consultation in Post-Operative Pituitary Surgery: Is it Necessary?" 53rd Annual Congress of the Canadian Neurological Sciences Federation, Halifax, NS, June 24, 2018; Canadian Journal of Neurological Sciences, P.039, 45(S2), S26-S26, June 2018.

**Dakson A, McNeely PD**. "Nico-Assisted Neuroendoscopic Management of Enlarging Subependymal Giant Cell Astrocytoma in Tuberous Sclerosis Complex: A Case Report." 2018 Poster Presentation at the Canadian Neurological Sciences Federation Annual Meeting. Halifax, NS. Canadian Journal Neurological Sciences 45(Suppl 2):S28-S29, 2018.

**Dakson A, Walling S**. "Spinal Extra-Dural Thoracic Meningioma: A Rare Occurrence with Surgical and Prognostic Implications." Atlantic Canada Spine Meeting, Fox Harbour NS, 2018.

Imran F, Berscheid J, Mustafa S, **Hebb A**, Tramble L, Kaiser S, **Clarke DB**, Imran Sa. "A Comparative Analysis of Incidental versus Clinically Manifesting Acromegaly Patients." Endo 2018, Chicago, Illinois, March 17, 2018; Endocrine Society Website Publication. Endo 2018.

Massoud E, **Hebb A, Clarke DB**. "Securing The Nasoseptal Flap in Endoscopic Transsphenoidal Surgery: No Foley Catheter Needed!" 53rd Annual Congress of the Canadian Neurological Sciences Federation, Halifax, NS, June 24, 2018; Canadian Journal of Neurological Sciences, P.036, 45(S2), S25-S25, June 2018.

Sharifi B, Fisher CG, Jacobs B, Bailey CS, **Christie SD**, Charest-Morin R, Thomas K, Rampersaud YR, McIntosh G, Dea N. "Consultation and Surgical Wait Times in Patients with Cervical Spondylotic Myelopathy: A Prospective Canadian Spine Outcomes and Research Network (CSORN) Study." Spine J 18(2018): S162 Nass/Los Angeles, 2018.

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Vaninetti N, Mustafa S, Doucette S, Glasgow R, Tramble L, **Hebb A, Clarke DB**. "New-Onset Secondary Hormone Deficiency in Patients with Incidental versus Clinically Manifesting Sellar Masses." 53rd Annual Congress of the Canadian Neurological Sciences Federation, Halifax, NS, June 26, 2018; Canadian Journal of Neurological Sciences, P.040, 45(S2), S26-S26, June 2018.

**Weeks A**. "When To Fix the Leak, And When to Fix the Brain." CNSF Conference, Banff Alberta, 2018.

# Invited Lectures

**Christie SD.** "Cervical Spondylosis: Diagnosis and Management." Ottawa Neurosurgery Review Course, Ottawa ON, 2018.

**Christie SD.** "Decision Making for Symptomatic but "Stable" Spinal Metastases." Canadian Contemporary Spinal Techniques. 2018.

**Christie SD.** "Evolving Role for Acute Care in SCI." Brain Repair Centre, Halifax, NS, 2018.

**Christie SD.** "Innovation in the Neurosurgical OR: O-Arm and Spinal Navigation." Canadian Neuroscience Federation, Halifax, NS, 2018.

**Christie SD.** "MAP and Timing of Surgery in Traumatic Spinal Cord Injury." Canadian Orthopaedic Association, Victoria, BC, 2018.

**Christie SD.** "Spinal Biomechanics, Decision Making and Surgical Options in Degenerative Spine Disease." Ottawa Neurosurgery Review Course, Ottawa ON, 2018.

**Christie SD.** "Spinal Cord Injury: What will be different in 10 years?" Atlantic Canadian Spine Meeting, Fox Harbor, NS, 2018.

**Christie SD.** "Spinal Cord Injury: Where do we go from here?" Atlantic Mobility Action Project, Annual Meeting, Whitepoint Lodge Resort, NS, 2018.

**Christie SD.** "Spinal Metastases: What can surgery offer?" Clinical Oncology Grand Rounds, Halifax, NS, 2018.

**Christie SD.** "Synergistic opportunities between the COA and CSS." Canadian Orthopaedic Association, Victoria, BC, 2018.

**Christie SD.** "What is Spinal Balance All About? "Canadian Neuroscience Federation, Halifax, NS, 2018.

**Clarke DB.** "Transsphenoidal Surgery: The Halifax Experience." First Annual Saint John Neuropituitary Program Retreat, Saint John, NB, 2018.

**Clarke DB.** "Anatomy of the Insula." Canadian Association of Electroneurophysiology Technologists, Annual General Meeting, Halifax, NS, 2018.

**Clarke DB.** "Cushings Disease: A Surgeons Perspective." Cushings Support Group, Halifax, NS, 2018.

**Clarke DB.** "Epilepsy Surgery Consistency in Changing Times." Visiting Professorship, University of British Columbia, Vancouver, BC, 2018.

**Clarke DB.** "Innovation in OR Technologies, the Stealth Autoguide." Chair, Medtronic Lunch and Learn, 53rd Annual Congress of the Canadian Neurological Sciences Federation, Halifax, NS, 2018.

**Clarke DB.** "Innovation in Training the Surgical Team the Future is Now." Annual General Meeting, Nova Scotia Health Authority, Halifax, NS, 2018.

**Clarke DB.** "Surgical Treatment of Epilepsy." 6th Annual Ottawa Neurosurgery Review Course, Ottawa, ON, 2018.

**Pickett GE.** "Decompressive Hemi-Craniectomy for Stroke." Atlantic Stroke Conference, Halifax, NS, October 2018.

**Pickett GE.** "Opening Pandora's Box: Risk, Uncertainty and Decision Making in Cerebrovascular Neurosurgery." Canadian Association of Neurological Nurses Annual Meeting, Halifax, NS, June 2018.

**Pickett GE.** "Pathophysiology, Diagnosis and Management of Vasospasm." Ottawa Review Course, Ottawa, ON, February 2018.

**Pickett GE.** "Stereotactic Radiosurgery for Skull Base Lesions." 53rd Congress of the Canadian Neurological Sciences Federation, Halifax, NS, June 2018.

**Pickett GE.** "The Brain: Our Inner World." Museum of Natural History, Halifax, NS, February 2018.

**Weeks A.** "Carotid Stenosis for Primary Care." Atlantic Stroke Conference, Halifax, NS, October 2018.

**Weeks A.** "Stress Granules and Glioblastomas." Atlantic Mobility Action Project, General Meeting, White Point Beach Resort, NS, 2018.

**Weise L.** "Canadian Experience." Evolve Workflow, Canadian Neuromodulation Society, 2018.

**Weise L.** "DBS-The Helsler experience." Goethe University, Frankfurt, Germany, 2018.

**Weise L.** "Lateralization in Parkinson's Disease." Poster, Mind over Matter Parkinson's Conference, Halifax, NS, 2018.

# Neurosurgery Rookie Camp

## Training the next generation of Canada's Neurosurgeons

**Director:** Cian O'Kelly

**Site Director for 2018:** Sean P. Barry

July 2018 saw another successful iteration of the Canadian Neurosurgery Rookie Camp at Dalhousie University. Local faculty included Dr. Sean Barry, Dr. David Clarke, Jen Hoyt and Murray Hong. We had 21 residents from across Canada, 11 faculty, our surgical skills staff and several industry representatives, all of whom worked tirelessly to make this a highly valued experience for our Neurosurgical Rookies. Feedback was again unanimously positive.

This course, founded in Halifax in 2012 by Dr. David Clarke, continues to take an important place at the national level in the early development of our neurosurgical trainees. We look forward to transitioning our residents, faculty and our industry partners to London, Ontario as we "pass the torch" to the Division of Neurosurgery at Western University as Rookie Camp hosts for 2019 and 2020. Halifax neurosurgery staff will continue to participate in faculty.

The Canadian Neurosurgery Rookie Camp is endorsed by the Royal College of Physicians and Surgeons of Canada's Specialty Committee in Neurosurgery and the Canadian Neurosurgical Society. A special thank you to this year's sponsors: Medtronic, Integralife, KLS Martin, Synaptive Medical, Surgi-One Medical and The Canadian Neurosurgical Society.

Visit [www.neurosurgeryrookie.ca](http://www.neurosurgeryrookie.ca)





# Clinical Neuroscience Guest Speakers



## DR. SIDNEY CROUL

**Topic:** "Genesis of Glioblastoma"

**Dr. Sidney Croul** completed university, medical school, neurology residency, and neuropathology fellowship at The University of Pennsylvania in Philadelphia. Following that, he served as Neuropathologist at Medical College of Pennsylvania, Hahnemann Medical School, and Drexel University Medical School in Philadelphia. In 2006, he accepted an offer to come to Canada and served as Head of Neuropathology at University Health Network in Toronto. Since July 2014, Dr. Croul has been part of the Department of Pathology at Dalhousie University / QEII Health Sciences Centre.



## DR. JEREMY MOELLER

**Topic:** "Optimizing the use of Technology in Neuroscience Education"

**Dr. Jeremy Moeller** completed medical school and neurology residency at Dalhousie, and then trained in epilepsy and EEG at Columbia University Medical Center in New York. He was a part-time faculty member in the Division of Neurology at Dalhousie before moving to Yale University, where he has been Neurology Residency Program Director since 2014 and Associate Vice-Chair of Education in the Department of Neurology since 2017. He has clinical interests in epilepsy and general neurology, and his primary scholarly interest is in medical education, particularly the use of new technology in neurology education.



## DR. ALIREZA MANSOURI

**Topic:** "Clinical and Translational Approaches in Surgical Neuro-Oncology to Advance Patient Care"

**Dr. Alireza Mansouri** completed his Neurosurgery residency at the University of Toronto in 2017. He also attained a Master's degree in Clinical Epidemiology from McMaster University, focusing on randomized clinical trials. Upon graduation from residency, Dr. Mansouri completed a research fellowship at the National Institutes of Health, focusing on surgical clinical trials in Neuro-Oncology. He is currently completing a clinical surgical neuro-oncology fellowship at Toronto Western Hospital. His academic focus has been on promoting the important role of neurosurgeons in clinical trial design and implementation. To this end, he has been actively involved in various device and early phase drug trials pertinent to neuro-oncology.



## DR. OSAAMA KHAN

**Topic:** "Innovation in Neuro-Oncology and Surgical Education"

**Dr. Osaama Khan** completed his Bachelor's and MD at the University of Manitoba as well as his Masters in Pathology (Neuropath). He completed residency training in Neurosurgery at the University of Toronto. In his research year, Dr. Khan spent four months in Montpellier, France, to work with Dr. Hugues Duffau on awake mapping for low grade gliomas. That same year, he was a research fellow for four months at Cornell in NYC working on expanded endoscopic endonasal approaches in their skull base lab. In 2016, he finished a Skull base fellowship with Dr. Jacques Morcos in Miami. Dr. Khan then joined Northwestern Medicine in Chicago to build up the brain tumor program with expertise in awake craniotomies and skull base surgery. He is currently Director of the Surgical Neuro-Oncology and the Brain tumor bank in the Western Suburbs. Dr. Khan's clinical interests are in developing novel tumor biomarkers in gliomas and improving outcomes in brain tumor surgeries.

## DR. DOUGLAS JAMES (DJ) COOK

**Topic:** "Intraoperative Situational Awareness in the Era of Precision Medicine"

**Dr. Douglas James (DJ) Cook** is an Associate Professor of Neurosurgery and Neuroscience at Queen's University. He completed his MD and neurosurgery residency and PhD at University of Toronto and a fellowship in cerebrovascular and skull base surgery at Stanford University in California. Dr. Cook returned to Canada to found the Translational Stroke Research Program at Queen's and has focused on late stage evaluation of stroke therapeutics prior to clinical trials, mechanisms of stroke recovery and translation of new therapies to enhance stroke recovery from basic research to clinical trials. Studies include focusing on how brain circuitry is disrupted following stroke and brain trauma and how the brain recovers from these injuries. Dr. Cook has refined multi-sequence MRI imaging techniques and pioneered the use of minimally invasive brain surgery techniques to improve outcomes for patients with cerebrovascular pathology and brain tumours, culminating an interest in surgical bioinformatics that have become the focus of new initiatives in applying multimodal surgical data to pre-operatively establish and intraoperatively modify surgical plans.

## DR. AARON ROBICHAUD

**Topic:** "Identifying New Molecular Targets for Glioblastoma Chemotherapy and the Role of Collaboration in Neuro-oncology Research and Clinical Care"

**Dr. Aaron Robichaud** is a sixth year Neurosurgery Resident at Dalhousie University. Prior to residency training, he obtained a bachelor's degree in biology at Mount Allison University, completing honour's research focusing on the development of a DNA vector for transfection of human genes into *Drosophila melanogaster*. He completed his MD through Dalhousie medical school and began his neurosurgical residency in 2012. From 2015 to 2017, Dr. Robichaud completed research in the laboratory of Dr. Adrienne Weeks investigating the role of cytoplasmic stress granules in treatment resistance in glioblastoma. His interests are primarily in the field of neuro-oncology, and he plans to undertake a fellowship in skull base surgery to further advance his ability to surgically treat tumours throughout the intra-cranial compartment.

## 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  
Dr. Dorianne Rheaume, 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

### 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  
Dr. Brian Wheelock

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

Dr. Falah Maroun  
Dr. Gerry Murray  
Dr. Andre Engelbrecht  
Dr. Greg Jenkins  
Dr. Roger Avery

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**Acknowledgements for Annual Report:**

Lorraine Bell-Hill

Ron Hill

Kelly Martin

# HALIFAX NEUROSURGERY

# 20 18

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REPORT

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## DIVISION OF NEUROSURGERY

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