



**HALIFAX
NEUROSURGERY**

20

15

ANNUAL REPORT

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Message from the Head of Neurosurgery

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

Welcome to the Division of Neurosurgery's 2015 Annual Report. It is my pleasure to introduce you to our team and to update you on the year's events and accomplishments.

What Halifax neurosurgery means to me was brought home recently in the outpatient clinic. I saw a patient who had suffered a life-threatening traumatic head injury several months previously: he had emergency surgery and spent a prolonged period on our neurosurgery service. He had missed his first scheduled follow-up appointment but was eager to see me because he wanted me to see what a spectacular recovery he had made – and indeed it was a spectacular recovery! When the visit ended, I shook his hand, said good-bye and turned to leave the clinic room. He said “Doc...” I turned around to hear him say, hesitatingly and with tears of appreciation in his eyes... “You have... a great team!”

A great team indeed! Where it is known by nursing students that 7.3 is the best place to train and practice acute-care nursing; where our OR team of dedicated neurosurgical nurses and neuroanesthetists is the envy of the country; where the best of the best neurosurgery residents come to be trained; and where our research and educational efforts are recognized on the national and international stages. And all that we do is possible because, whatever our task, each does her or his part to contribute to make a great team – and for that we are proud. Welcome to the Division of Neurosurgery's 2015 Annual Report. It is my pleasure to update you on the year's events and accomplishments.

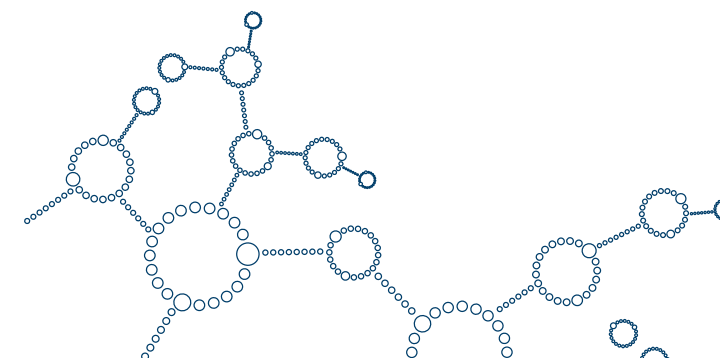
A bittersweet event in 2015 was saying farewell to Dr. Rob Brownstone after an academically impressive fifteen years with the Division. Bitter because we will miss him; sweet because we know he will continue to do great things in his new position in London, England.

We were delighted to welcome our newest neurosurgeon, Dr. Jacob Alant, to our neurosurgical team. He and his family moved to Nova Scotia from Calgary over the summer – it has been great having Dr. Alant with us. Welcome to all new members of the Neurosurgery family – we are glad to have you.

Our multi-million dollar QEII Academic Neuroscience Program fundraising is now complete, thanks to the generosity of donors, the work of the QEII Foundation and strong administrative support within the hospital and Nova Scotia Health Authority, including our 7.3 manager Fran Kelloway, our Director, Randi Monroe, and Nova Scotia Health Authority Vice Presidents Paula Bond and Allan Horsburgh. This project is several years in the making and I am delighted to be able to say that we expect to see this project materialize in 2016. Renovations will get underway on 7.3/7.4 starting in the New Year. Teams of people are already working on the transition process: this time next year we will have a neuroscience clinical unit that will house neurology, spine and neurosurgery in-patients; a unit that will have a brand new Intermediate Care Unit and a brand new Epilepsy Monitoring Unit. It will be an exciting year ahead! I am also proud of the family of regional neurosurgical services – including St. John's, Moncton, Saint John, the IWK Health Centre and the QEII Health Sciences Centre. We work closely together to provide the best possible neurosurgical care to the people of Atlantic Canada.

We have much to be proud of again this year: I think you will agree as you enjoy the read!

“Doc...” I turned around to hear him say, hesitatingly and with tears of appreciation in his eyes... “You have... a great team!”



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, Neurosurgery Spine Program
- 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

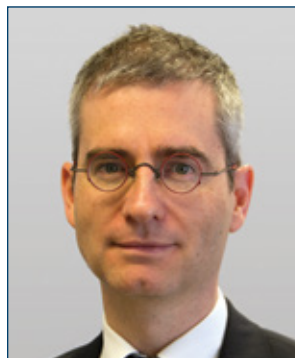


ROBERT BROWNSTONE MD, PhD, FRCSC

- Professor, Division of Neurosurgery and Medical Neuroscience

Areas of Interest:

- Neural Circuit Function
- Functional Neurosurgery
- Epilepsy Surgery
- Movement Disorders
- Complex Pain
- Spasticity



DANIEL MCNEELY MD, FRCSC

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

Areas of Interest:

- Pediatric Neurosurgery
- Pediatric 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



SIMON WALLING MBChB, FRCSC

- Assistant Professor, Department of Surgery

Areas of Interest:

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

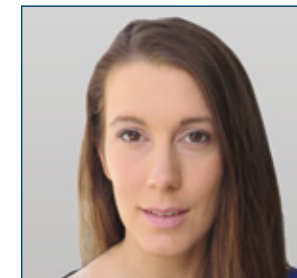


GWYNEDD PICKETT MD, FRCSC

- Assistant 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

Neurosurgery Residents



PHILIPPE MAGOWN MD

Postgraduate Year 6
MDCM McGill University
Quebec, Canada

Dr. Philippe Magown obtained his medical degree at McGill University in Montreal, Quebec in 2005. Dr. Magown is doing PhD research in Dr. Brownstone's laboratory, focusing on embryonic stem cell research. Dr. Magown is expected to complete his residency training with Dalhousie University this year.



JULIA RADIC MD

Postgraduate Year 6
MD Queens University
Ontario, Canada

Prior to obtaining her medical degree, Dr. Radic attended the University of Miami where she earned her Bachelor of Science in Physics and Marine Science. Her elective training in neurosurgery at Dalhousie University and the Hospital for Sick Children in Toronto influenced her decision to pursue Neurosurgery training. Dr. Radic completed her Master's in Public Health at Harvard University in 2013. She is expected to complete her residency training with Dalhousie University this year.



GREG JENKINS MD

Postgraduate Year 5
MD Memorial University
Newfoundland, Canada

Dr. Jenkins obtained his medical degree at Memorial University in 2011. He also earned an honors degree in biochemistry at Memorial University in 2007. Dr. Jenkins is expected to complete his residency training with Dalhousie University in 2017.



DAVID BRANDMAN MD

Postgraduate Year 4
MD University of Calgary
Alberta, Canada

Dr. David Brandman obtained his medical degree at the University of Calgary in 2010. Prior to studying medicine, he pursued a degree in biophysics at the University of British Columbia. Dr. Brandman is currently in PhD studies at Brown University studying brain-machine interface.



AARON ROBICHAUD MD

Postgraduate Year 4
MD Dalhousie University
Nova Scotia, Canada

Dr. Robichaud obtained his medical degree from Dalhousie University in 2012. 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 2018.



AYOUB DAKSON MD

Postgraduate Year 4
MD University of Manchester
Manchester, England

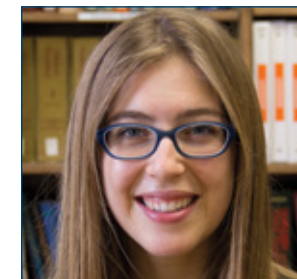
Dr. Ayoub Dakson obtained his MBChB from the University of Manchester, England in 2011 with a Masters in Medical Research (Merits). Prior to this, he completed a BSc (honors) in Medical Sciences in St. Andrews University. Dr. Dakson is expected to complete his training in 2018.



JOHN ADAMS MD

Postgraduate Year 3
MD Memorial University
Newfoundland, Canada

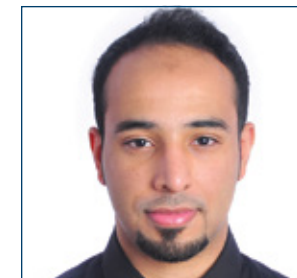
Dr. Adams obtained his medical degree at Memorial University in 2013. Prior to studying medicine, Dr. Adams obtained a Bachelor of Science Degree in Neuroscience. Dr. Adams is expected to complete his training with Dalhousie University in 2019.



HEIDI GODBOUT MD

Postgraduate Year 1
Université de Sherbrooke
Quebec, Canada

Dr. Godbout obtained her medical degree at the Université de Sherbrooke in 2015. Prior to studying medicine, Dr. Godbout obtained her undergraduate degree in Health Sciences. Dr. Godbout is expected to complete her residency training with Dalhousie University in 2021.



OMAR ALSHARIF MD

Postgraduate Year 1
MD King Saud University
Riyadh, Saudi Arabia

Dr. Alsharif obtained his medical degree at King Abdulaziz University in 2011. 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. He is expected to complete his residency training with Dalhousie University in 2021.



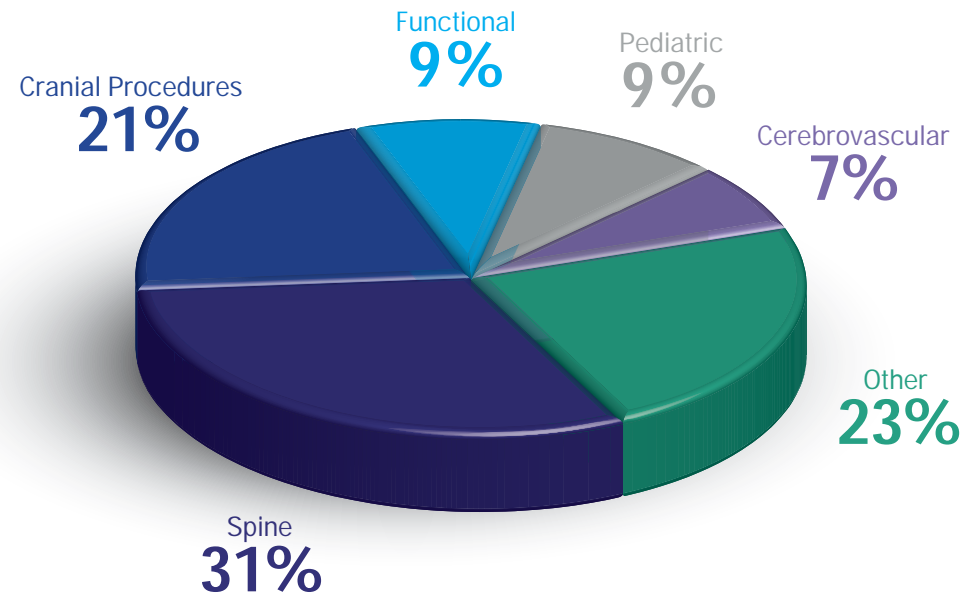
DWAINE COOKE MD

International Clinical Trainee
Kingston, Jamaica

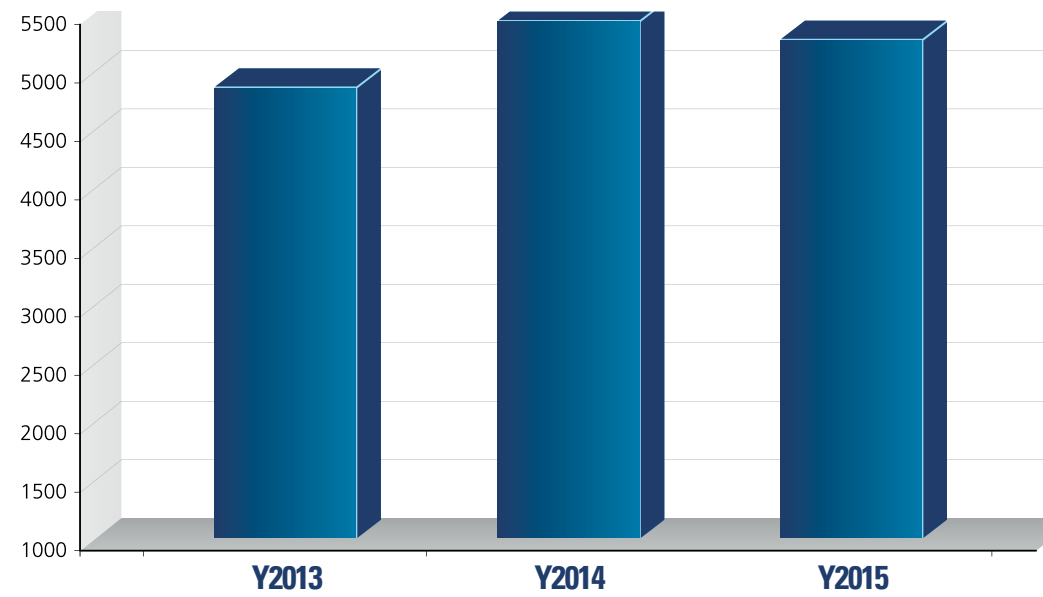
Dr. Cooke is a neurosurgery resident from the University of West Indies Neurosurgery Training Program in Kingston Jamaica. Dr. Cooke is spending 18 months with Neurosurgery at Dalhousie to complete his required out of program training. He will return to Jamaica once his training at Dalhousie is complete.

Clinical Activities

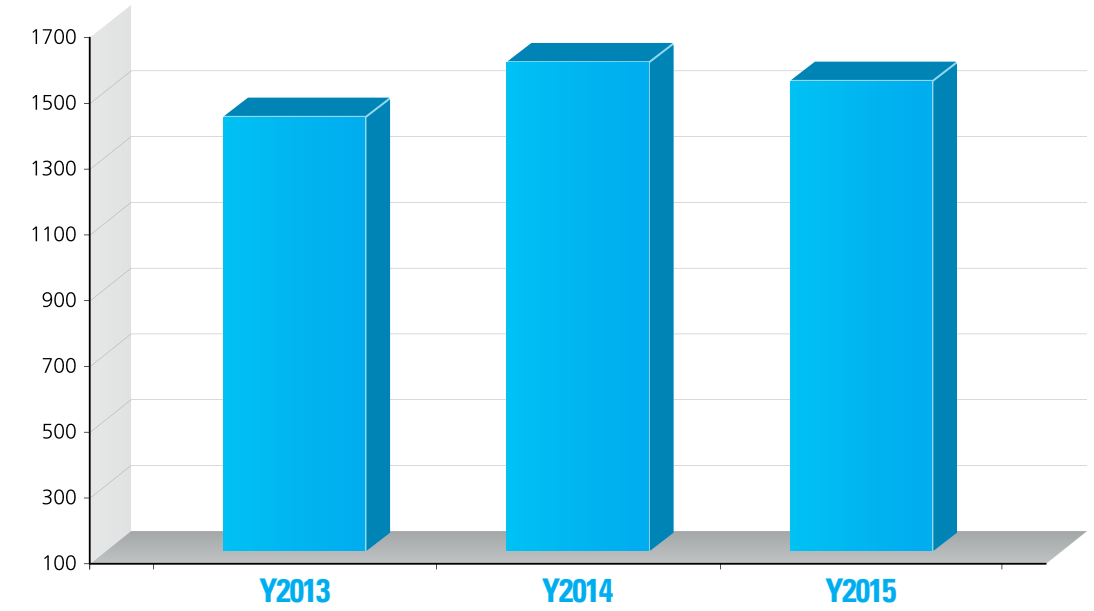
Neurosurgical Procedures



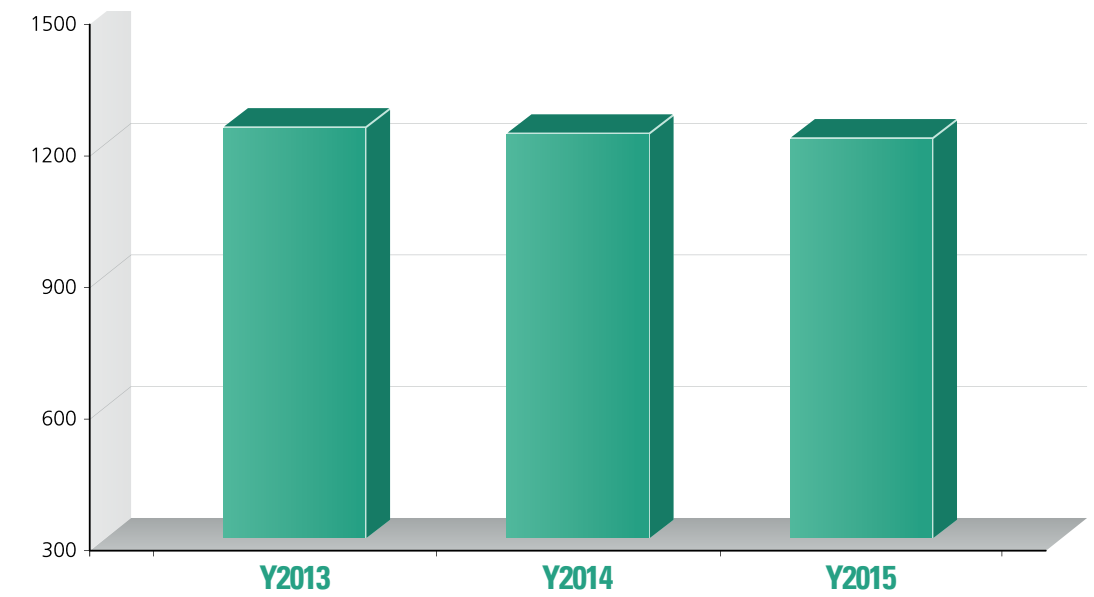
Ambulatory Care Visits



Admissions



Neurosurgical Procedures



Neurosurgery Inpatient Unit 7.3



FRAN KELLOWAY
Health Service Manager

The year has been spent planning the expansion to our Neurosciences Alliance with our Neurology and Orthopedic-Spine partners. This expansion includes an increase in our IMCU capacity from four beds to six, expanding and moving our Epilepsy Monitoring Unit (EMU) from two beds to four beds and amalgamating our Neuro-Ortho Spine (NOS) patients onto our Neurosurgery inpatient unit with an increased capacity from twelve to seventeen beds. These planned renovations have been made possible by funds generously donated through our QEII Foundation. In concert with the planning for the construction changes required, we have been working with Professional Practice to look at our staffing and our models of care for our new Neuroscience Alliance teams who will staff Neurosurgery, NOS and Neurology.

In 2015, the Neurosurgery Inpatient Unit continued to experience some changeover in nursing staff related to relocations/new positions within Neurosurgery, personal leaves and maternity leaves. In total, we've hired nineteen new nursing staff this year: twelve new RNs (five permanent, five in assignments and two casual) and seven LPNs (two permanent, one in an assignment and four casual). In addition to this turnover in staff, we have welcomed two floor nurses into the charge role, Shelley Nikolaev and Dayna El-Hassan. Nicky Ayles has taken a new position in neurosciences as a clinic nurse and Jill (Northrup) Howarth has stepped in as Resource Nurse. Missy Brinson is our new Brain Tumour Nurse with Karen Vickers' retirement. Teresa Chapman retired after many years with Neurosurgery as a staff nurse and then charge nurse.

LPNs added a new skill to their scope with the roll out of the new IV maintenance and therapy policy. LPNs are now inserting peripheral IV's and hanging standard IV hydration therapy. Nurse Practitioners, Carole-Ann Miller and Angela Meagher, as well as Rachel MacDougall, Clinical Nurse Educator, and the Professional Practice Committee have reviewed and revised three of the outdated patient pamphlets. New educational materials for the NOS patient population are being reviewed, Angela Meagher has revised the pre-printed orders (PPO) for post-op spine patients and it is currently being reviewed by pharmacy.

7.3 Nursing Professional Practice Committee revised the nursing Kardex and is working toward improving quality initiatives such as chart audits. The pre printed orders for the post operative management of Diabetes Insipidus have been approved and are available for prescriber use. We have reviewed and made changes to the staffing model in the Epilepsy Monitoring Unit when there are patients with implanted leads admitted, requiring constant RN supervision/care. Rachel MacDougall, Christine Potvin and Myrna King have created a first draft of the delegated medical function policy for the Neuromodulation clinic.

The Neurosurgery Quality Management Committee, consisting of members from various disciplines, continues to meet on a monthly basis to identify successes as well as issues related to quality and efficiency of care, patient safety and accreditation standards. The purpose of the committee is to promote education and excellence in patient care and safety.

Academic Neuroscience Program

Academic Neuroscience Program

At the QEII, the Divisions of Neurosurgery, Neurology and Orthopedic Surgery (spine program) have come together with a goal to help advance neurosciences for all Atlantic Canadians. This plan will see Neurology, Neurosurgery, and Spine come together on 7.3 and 7.4 with a new state of the art Intermediate Medical Care Unit (IMCU) and Epilepsy Monitoring Unit (EMU). By sharing a common space, we will draw upon each other's knowledge and experience to build the best possible teams of care providers. For patients, it means being able to receive the most comprehensive care in Atlantic Canada including prevention, intervention, long-term management, outreach and links to community providers.

Planning for the Care

The Academic Neurosciences will create a different bed configuration. We are committed to having the right skill mix to ensure we are able to deliver excellent patient care. Professional Practice, led by Paola Booker and Cathy Ann Casault, have assisted us in looking at our many programs' services and a complement review for nursing, occupational therapy, physiotherapy, social work, and recreation therapy. Two town halls were organized in November 2015 to review specifics of the project as well as provide an opportunity for staff to ask questions.

Design, Construction and Move

An architectural firm, Stantec, has designed the new 4 bed EMU and a 6 bed IMCU. These plans have been approved by our executive and Department of Health & Wellness. The plans have been put out to tender and various construction companies will bid on the job. Joe Beck, an industrial engineer in Central Zone is working with the leadership team and working groups to best organize all required moves during renovations.

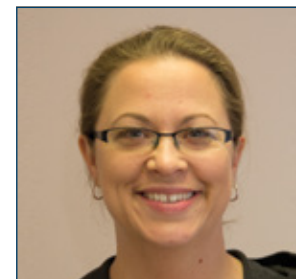
Fundraising

For many years, this has been a dream and in 2013, The QEII Foundation launched a fundraising campaign to support the new Academic Neuroscience Program. In 2015 the QEII Foundation completed its fundraising in the amount of 2.5 million dollars to help us achieve our dream.

We would like to thank the QE II Foundation and the Nova Scotia Health Authority leadership for their support in this endeavor.



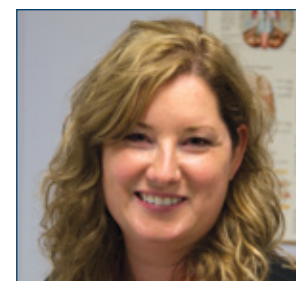
Clinical/Research Staff



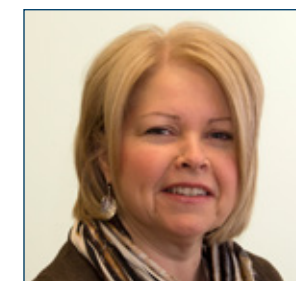
NICKY AYLES
RN
Neurosurgery Clinic



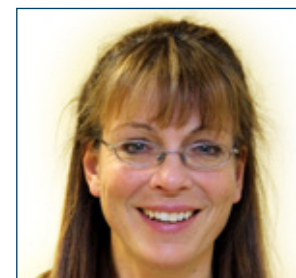
MISSY BRINSON
RN
Brain Tumour Liaison Nurse



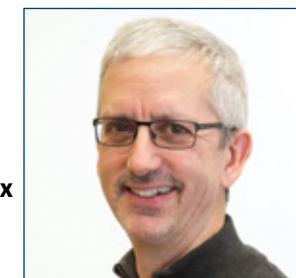
CORALEA CAREY
Neurosurgery Clinic Aide
& Research Assistant



LYNNE FENERTY
RN, BN, DO(MP)
Program Manager:
Neuro-Trauma/Injury Prevention



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



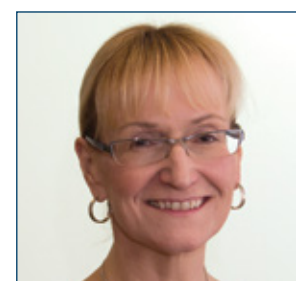
RON HILL
Program Coordinator:
Technology/Robotics



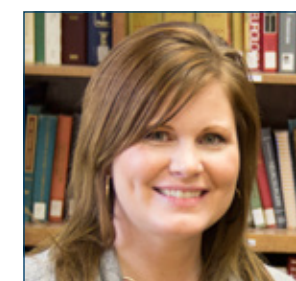
MURRAY HONG
PhD
Imaging Specialist



JUDITH JARRETT
RN, CCRP
Program Coordinator:
Cerebrovascular



LORRAINE JARVIE
RN
Research Coordinator:
Spine



CAROLYN KELLY
OT(Reg)
Program Coordinator:
Neuromodulation

Clinical/Research Staff (cont'd)



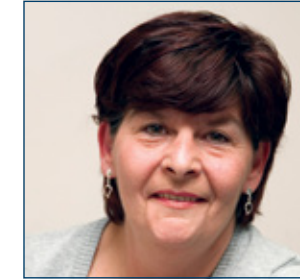
NELOFAR KURESHI
MD, MHI
Research Associate:
Neurotrauma/Simulation/
Spine



LISA MARTIN
RN
Research Coordinator:
Spine



KARINA RANKKA
Health Services Manager:
Neurosurgery Clinic



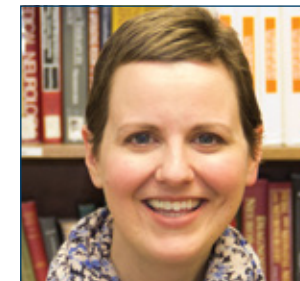
JACKIE SEAGERS
Neurosurgery Clinic Aide



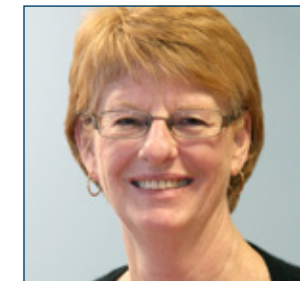
ANITA MCPHEE
RN
Research Coordinator:
Spine



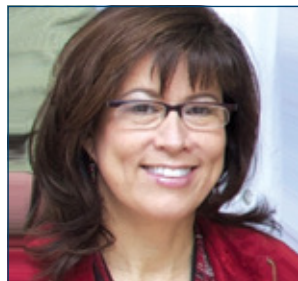
ANGELA MEAGHER
RN, NP
Neurosurgery Spine Program



**GINETTE THIBAUT-
HALMAN**
RN, CNN(c), MSc
Program Coordinator:
Neuro-Trauma/Injury Prevention/
Neurosurgery Spine



KAREN VICKERS
RN
Brain Tumour Liaison Nurse



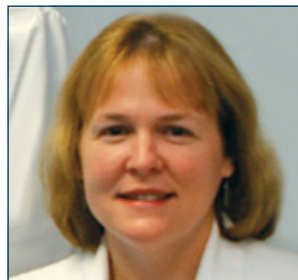
CAROL-ANN MILLER
RN, NP
Cerebrovascular Program



PHIL NICKERSON
PhD
Research Associate:
Neurosurgery Spine



TIFFANY WEBBER
Spine Referral Triage



LESLIE PERRIN
RN
Neurosurgery Clinic



SARANYAN PILLAI
PhD
Research Associate:
Neurosurgery Spine

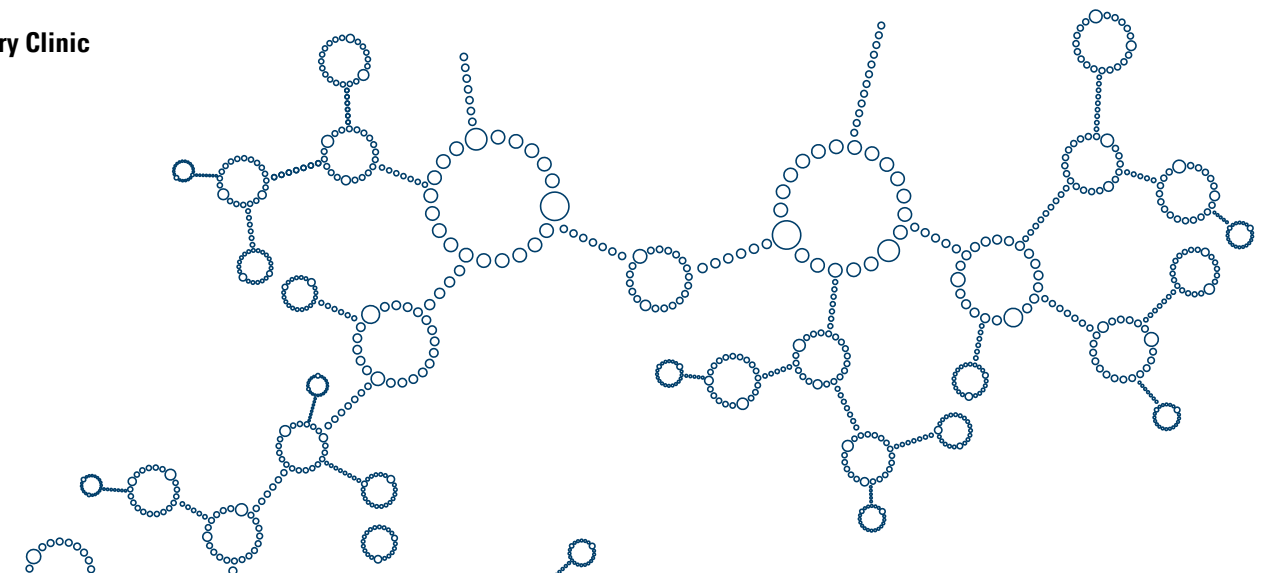
RYAN MITCHELL
RN
Neurosurgery Clinic



CHRISTINE POTVIN
RN
Program RN:
Neuromodulation



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



Neurosurgery Spine Program



LEFT TO RIGHT:
Dr. S. Barry, A. McPhee, G. Thibault-Halman, P. Nickerson, N. Kureshi, A. Meagher, M. Cook, Dr. S. Christie

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

Accomplishments

- This year, we welcomed Dr. Jacob Alant to the Spine Program. Dr. Alant completed his residency training at the University of Pretoria, and then pursued his spine fellowship at the University of Calgary. Dr. Alant has also completed a Peripheral Nerve Fellowship as well as a Masters in Neuroscience at the University of Calgary. We are extremely pleased that he has joined the team.
- We would also like to welcome our new spine research coordinator, Lorraine Jarvie to the team. Lorraine brings many years of clinical and research experience, in both pediatric and adult settings, to the program.
- We would like to extend best wishes to Phil Nickerson. After four years of research with the Brain Repair Centre and Atlantic Mobility Action Project, focused on secondary spinal cord injury, Phil has accepted a position as a Senior Postdoctoral Research Associate with the University Health Network in Toronto.
- Saranyan Pillai has joined the Brain Repair Centre. Saranyan completed his PhD studies at the University of New Brunswick, Fredericton, and brings experience in physiology, biochemistry, and molecular biology research to the team.

- The Atlantic Canada Spine meeting was held for the seventh consecutive year as a regional CME spine-focused event. The topic of focus was Spinal Deformities. Dr. Stefan Parent of Université de Montréal was this year's invited guest speaker.
- The Skills Centre for Health Sciences continues to provide learning opportunities in spine procedures for residents and surgeons.
- Monthly Spine Lunch and Learn sessions were provided for the clinical staff of 7.3. These sessions will be expanded to include all neurosurgical programs in 2016.
- In conjunction with the Orthopedic Spine Program, a synoptic template for operative reports has been developed and implemented. This template provides a structured electronic operative report which provides quality clinical data and replaces traditional dictated operative reports.
- In collaboration with the Orthopedic Spine Program, planning and development of an in-house Spine Database is underway. This integrated database will substantially increase the ability to track clinical outcomes, improve patient care, and reduce healthcare costs.

Research

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

- **Accelerometric Gait Analysis of Cervical Myelopathy:** The prospective study analyzed the gait of patients with a diagnosis of cervical myelopathy before and after decompressive surgery using a gait monitor. Enrollment and follow-up are complete, and the study is in the manuscript preparation phase.
- **Incidence and Prevalence of Spinal Cord Injury (SCI) in Nova Scotia:** Data are being analyzed for a retrospective review of traumatic SCI in Nova Scotia spanning nearly three decades. In addition, a detailed retrospective review of aspects of SCI care over a six-year period, including timing of care, adverse events, and adherence to clinical guidelines has been completed. The manuscript for this study is in the submission process.
- **National Spine Surgeon Survey:** We are assessing the national spine surgeon workforce, using data from the Canadian Institute for Health Information (CIHI) to complement a completed national survey of orthopedic surgeons and neurosurgeons.
- **Modic changes in Chronic Lower Back Pain Patients:** Modic changes are specific changes seen in the spine on MRI, and have been associated with infectious processes. The changes are more commonly observed in patients who have low back pain than in the general population. A retrospective chart and radiological review is being conducted to determine whether patients with modic changes have poorer surgical outcomes than those without these imaging features.
- **Titanium Ion Concentrations Following Metal-on-Metal Cervical Arthroplasty:** This prospective study will assess serum titanium levels in patients receiving titanium Medtronic Atlantis Vision Elite Plate or a Titanium Medtronic Prestige LP implant. If titanium is wearing off then it will be detected in the blood, and if titanium levels in the blood are high, then there may be health concerns. These concerns will require further evaluation and may lead to the discontinuation of the surgical procedure in the future.

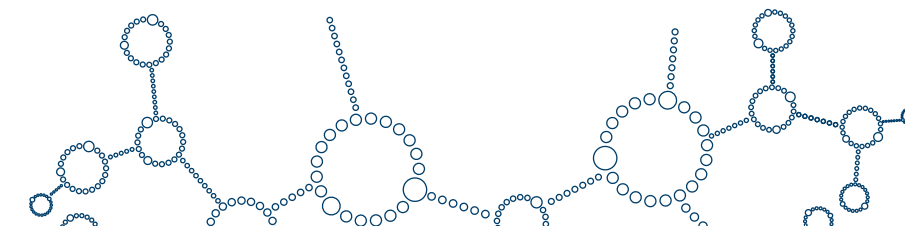
- **Utility of the Spinal Instability Neoplastic Score (SINS) System in Surgical Practice:** A retrospective chart review of patients with spinal metastatic cancer, to assess the Spinal Instability Neoplastic Score System (SINS) and its clinical utility in predicting surgical treatment decision is underway.

Several studies are conducted in partnership with the Rick Hansen Institute (RHI):

- **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 dollars through the Brain Canada MIRI competition.

- **The Minocycline in Acute Spinal Cord Injury (MASC) study** is a Phase III trial investigating the efficacy of IV minocycline in improving neurological and functional outcome after spinal cord injury.
- This year marks our 8th year of enrollment in the Rick Hansen Spinal Cord Injury Registry (RHSCIR), a national registry of patients with traumatic spinal cord injury (SCI).
- Using data collected nationally by RHSCIR and previously published inclusion/exclusion criteria for spinal cord injury (SCI) trials, we have examined the feasibility of recruiting subjects for acute SCI clinical trials in Canada. The manuscript for this study is being prepared for submission.
- The Canadian Spine Society (CSS) Registry is a national health data registry that tracks outcome measures of the surgical and non-surgical treatments of specific spinal conditions. QEII Spine Neurosurgeons have chosen to submit information on their patient population who will have a Cervical Arthroplasty procedure, patients with lumbar spondylolisthesis who will be treated with a Transforaminal Lumbar Interbody Fusion and patients who suffer from Cervical Myelopathy and Myeloradiculopathy. We are currently in our 2nd year of enrollment for this registry.



Presentations

Larouche J, Paquette S, Fisher C, Domisse I, Wadey V, Hall H, Finkelstein J, Bouchard J, Hurlbert J, Broad R, Fox R, Hedden D, Nataraj A, Carey T, Bailey C, Chapman M, Moroz P, Chow D, Wai E, Tsai E, **Christie S**, Lundine K, Paquet J, Splawinski J, Wheelock B, Goytan M, Ahn H, Massicotte E, Fehlings M and Yee A. "Development of a Canadian Competency-Based Spine Surgery Fellowship Education Curriculum". 15th Annual Scientific Conference of the CANADIAN SPINE SOCIETY, Halifax. February 27, 2015.

Invited Lectures

Barry S. CRAM Neurosurgery Head Injury Review – Dalhousie Medical Class of 2016. April 22, 2015. **Christie S.** "Cervical Arthroplasty: Does it make sense?" Canadian Neurological Sciences Federation. Toronto. June 10, 2015. **Christie S.** Critical Care of Spinal Cord Injury. Caribbean Neurosciences Symposium. Montego Bay. Feb 1, 2015.

Funding/Grants

Rick Hansen Institute. Canadian Multicentre Cerebrospinal Fluid Pressure Monitoring and Biomarker Study. \$240,925.00. 2012-2015 Rick Hansen Institute. Rick Hansen Spinal Cord Injury Registry. \$312,000. 2008-2016 Rick Hansen Institute. Minocycline in Acute Spinal Cord Injury study. \$263,200. 2015-2018. Medtronic of Canada, Ltd. Unrestricted research grant. 2014-2015 \$40,000

Publications

Ahn H, Bailey CS, Rivers CS, Noonan VK, Tsai EC, Fournay DR, Attabib N, Kwon BK, **Christie SD**, Fehlings MG, Finkelstein J, Hurlbert RJ, Townson A, Parent S, Drew B, Chen J, Dvorak MF; Rick Hansen Spinal Cord Injury Registry Network. Effect of older age on treatment decisions and outcomes among patients with traumatic spinal cord injury. CMAJ. 2015 Sep 8;187(12):873-80.

Evaniew N, Noonan VK, Fallah N, Kwon BK, Rivers CS, Ahn H, Bailey CS, **Christie SD**, Fournay DR, Hurlbert RJ, Linassi AG, Fehlings MG, Dvorak MF. Methylprednisolone for the Treatment of Patients with Acute Spinal Cord Injuries: A Propensity Score-Matched Cohort Study from a Canadian Multi-Center Spinal Cord Injury Registry. J Neurotrauma. 2015 Nov 1;32(21):1674-83.

Dvorak MF, Noonan VK, Fallah N, Fisher CG, Finkelstein J, Kwon BK, Rivers CS, Ahn H, Paquet J, Tsai EC, Townson A, Attabib N, Bailey CS, **Christie SD**, Drew B, Fournay DR, Fox R, Hurlbert RJ, Johnson MG, Linassi AG, Parent S, Fehlings MG; RHSCIR Network. The influence of time from injury to surgery on motor recovery and length of hospital stay in acute traumatic spinal cord injury: an observational Canadian cohort study. J Neurotrauma. 2015 May 1;32(9):645-54.

Paterson GI, **Christie S**, Bonney W, **Thibault-Halman G**. Synoptic operative reports for spinal cord injury patients as a tool for data quality. Health Informatics J. 2015 Sep 10.

Ahn H, Bailey CS, Rivers CS, Noonan VK, Tsai EC, Fournay DR, Attabib N, Kwon BK, **Christie SD**, Fehlings MG, Finkelstein J, Hurlbert RJ, Townson A, Parent S, Drew B, Chen J, Dvorak MF; Rick Hansen Spinal Cord Injury Registry Network. Effect of older age on treatment decisions and outcomes among patients with traumatic spinal cord injury. CMAJ. 2015 Sep 8;187(12):873-80.

Borgström F, Beall DP, Berven S, Boonen S, **Christie S**, Kallmes DF, Kanis JA, Olafsson G, Singer AJ, Åkesson K. Health economic aspects of vertebral augmentation procedures. Osteoporos Int. 2015 Apr;26(4):1239-49.

Fehlings MG, **Barry S**, Kopjar B, Yoon ST, Arnold P, Massicotte EM, Vaccaro A, Brodke DS, Shaffrey C, Smith JS, Woodard E, Banco RJ, Chapman J, Janssen M, Bono C, Sasso R, Dekutoski M, Gokaslan ZL. In Response. Spine (Phila Pa 1976). 2014 Jul 1;39(15):1265 **Barry S**, Dakson A. A case of chronic lower extremity weakness with ascending numbness and myelopathy. Spinal Columns. May 2015;15(2)

Team Members:

- Dr. S. Christie, Neurosurgeon, Director, Neurosurgery Spine Program
- Dr. J. Alant, Neurosurgeon
- Dr. S. Barry, Neurosurgeon
- Dr. D. McNeely, Neurosurgeon
- Dr. G. Pickett, Neurosurgeon
- Dr. S. Walling, Neurosurgeon
- Nelofar Kureshi, Research Associate
- Dr. P. Nickerson, Research Associate
- Dr. S. Pillai, Research Associate
- Lorraine Jarvie, Research Coordinator
- Lisa Martin, Research Coordinator
- Anita McPhee, Research Coordinator
- Ginette Thibault-Halman, Program Coordinator
- Tiffany Webber, Spine Referral Triage
- Debbie Amirault, Administrative Support
- Melissa Cook, Administrative Support
- Maureen Kay, Administrative Support

Team Collaborators:

- Dr. W. Oxner, Orthopedic Surgery
- Dr. A. Glennie, Orthopedic Surgery
- Dr. D. Alexander, Orthopedic Surgery
- Dr. Cynthia Dunning Zwicker, Research Manager, Orthopedic Spine Service
- Dr. C. Short, NS Rehabilitation Centre
- Dr. S. McVeigh, NS Rehabilitation Centre
- Dr. M. Lynch, Pain Management Unit
- Dr. I. Beauprie, Pain Management Unit
- Dr. M. Schmidt, Anesthesia
- Dr. S. Morris, Neurophysiology



Neuromodulation Program

Carolyn Kelly – Program Coordinator Christine Potvin – Program RN

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, as well as adults with pumps implanted for intrathecal baclofen therapy. We currently follow 219 people with stimulators for movement disorders, and 225 with stimulators for pain.

In addition to regular movement disorder rounds and complex pain rounds, in which patients are reviewed by the team and treatment options discussed, we run a complex pain clinic in which patients are seen and evaluated by both a neurosurgeon and a complex pain anaesthesiologist, and a treatment plan decided upon.

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, an analysis of the electrophysiological properties of subthalamic neurons in people with Parkinson's Disease.

In July 2015 the program bid a fond farewell to neurosurgeon Dr. Rob Brownstone who was with the program for 15 years. In September 2015 the program welcomed spine surgeon Dr. Sean Christie to the SCS program.

Team Members:

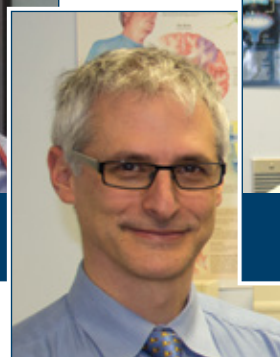
- Dr. S. Christie, Neurosurgeon
- Dr. I. Beauprie, Aneesthesiologist/Pain Specialist
- Carolyn Kelly, OT, Program Coordinator
- Christine Potvin, Program RN
- Dr. C. Short, Physiatrist
- Ron Hill, Neurosurgery Technology Coordinator
- Murray Hong, Neurosurgery OR/Technical Specialist
- Dr. J. Fisk, PhD, Neuropsychologist
- Dr. D. King, Neurologist (movement disorders)
- Dr. K. Schoffer, Neurologist (movement disorders)
- Dr. R. McKelvie, Neurologist (movement disorders)
- Dr. H. Rigby, Neurologist (movement disorders)



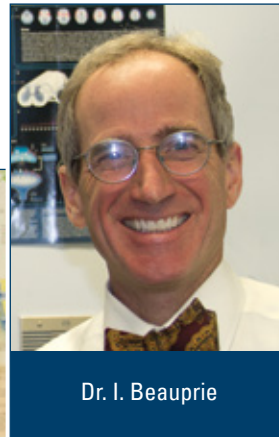
C. Kelly, C. Potvin



M. Hong



Dr. R. Brownstone



Dr. I. Beauprie



R. Hill

Epilepsy Program

Program Coordinator: Susan Rahey

The Epilepsy Program is a collaborative service supported by the Divisions of Neurology and Neurosurgery. Epilepsy patients referred from Nova Scotia, Prince Edward Island, New Brunswick and Newfoundland have access to:

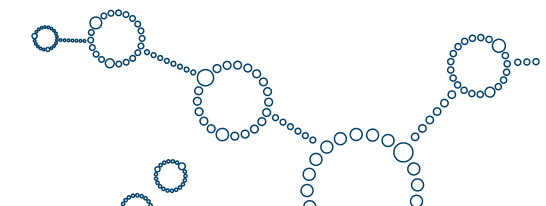
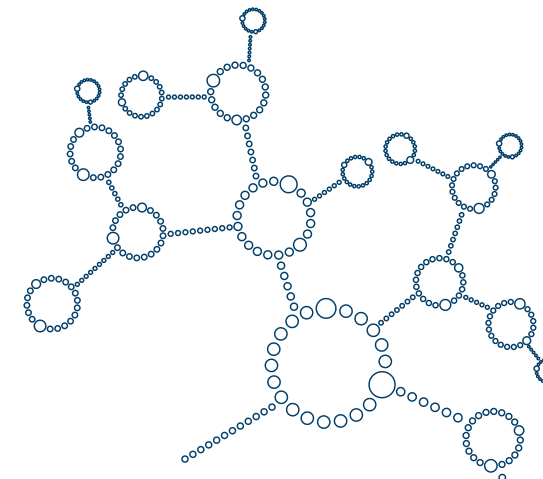
- specialty outpatient clinics with support from Neuropsychology and Social Work
- a two-bed inpatient Epilepsy Monitoring Unit (Phase I and Phase II studies)
- access to state-of-the-art imaging techniques (3T MRI, fMRI, PET and MEG)
- a variety of surgical options including cortical resection, lesionectomy, corpus callosotomy and vagus nerve stimulator implantation

Program Goals

- To offer people in Nova Scotia, Prince Edward Island, New Brunswick and selected patients from Newfoundland access to a comprehensive epilepsy program including access to investigational drugs and surgical techniques, in a timely fashion. We await with great anticipation the expansion of the EMU along with increased allocation of physician resources to the unit.
- To search for innovative ways to continue to improve all aspects of service, given the resources currently available.

Accomplishments

- There were 46 admissions to the Epilepsy Monitoring Unit (EMU). Included in that total were 4 admissions for invasive recording with subdural strips/grids, depth electrodes or a combination of the two. Epilepsy surgical procedures were performed on 16 patients and more than 1400 patients were assessed in the various outpatient epilepsy clinics.
- The two students enrolled in our EEG Technology Training Program, along with a third student (graduate of La Cité collégiale, Ottawa, Ontario) continued studies to prepare them for the C.B.R.E.T., Inc examinations, with an expected date of completion in May 2016.
- Fundraising for the Neurosciences Project, "Brain-Spine-Spirit: The Neuroscience Alliance" has concluded. The project will begin in early 2016 and includes expansion of our EMU from 2 to 4 beds.
- Weekly epilepsy case conferences continue to be widely attended by team members along with colleagues from the IWK Health Centre and the MEG laboratory. Discussions of outpatient and EMU cases are augmented by a monthly journal club.
- We continue to benefit from access to fMRI, PET, MEG and 3T MRI scanning for pre-surgical assessment.
- 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 26 continues to be a high point of the year, with many staff and patients volunteering or attending our booth 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 and bench research, including drug trials, neuropsychological profile development, brain stimulation and imaging techniques/modalities.

Challenges

The loss of Dr. Robert Brownstone to Queens Square in London England was mitigated solely through the efforts of our remaining surgeon, Dr. David Clarke. Our surgical numbers remained stable.

Efforts to identify an additional epileptologist to support Dr. Sadler have remained fruitless. Difficulties continue with scheduling OR time, a nation-wide shortage of trained EEG Technologists and intermittent antiepileptic drug shortages in Canada.

Future Directions

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

Team Members:

- Dr. D. Clarke, Neurosurgeon
- Dr. D. McNeely, Neurosurgeon
- Dr. R. Mark Sadler, Neurologist
- Dr. B. Pohlmann-Eden, Neurologist
- Susan Rahey, Neurology, Program Coordinator
- Dr. A. Omsade, Neuropsychologist
- Dawnette Benedict-Thomas, Psychometrist
- Karen Legg, Neurology, Nurse Practitioner
- EEG Technologists
- Heather Smith, Social Worker
- Rachel Millet, Social Worker

Team Collaborators:

- Divisions of Neurology, CDHA and IWKHC
- Neuroradiologists
- Neuroscience and Perioperative Nursing Staff
- Biomedical Translational Imaging Centre Staff
- Maritime Medical Genetics Service
- Health Services Managers
- Biomedical Engineering
- Sterile Processing



BACK (LEFT TO RIGHT): Dr. R. Brownstone, D. Cooke, T. Bardouille, Dr. D. Clarke, Dr. B. Pohlmann-Eden, Dr. I. Mohamed, Dr. S. Douglas
FRONT (LEFT TO RIGHT): A. Taylor, S. Walsh, S. Rahey, K. Legg, Dr. M. Sadler, T. Bjork

Neurosurgery Simulation Program

Neurosurgical simulation training has the potential to become an important educational tool for residents, surgeons, and perioperative clinicians. Postgraduate medical education governing bodies including the Accreditation Council for Graduate Medical Education and the Royal College of Physicians and Surgeons of Canada mandate residency programs to teach and assess trainees in core competencies that encompass cognitive, psychomotor and affective domains. Simulation-based training and assessment is a valuable platform for teaching and evaluating procedural skill competence in many clinical disciplines. The Neurosurgery Simulation Program is led by Dr. David Clarke and supports the advancement of innovative simulation-based learning for health professionals. The program is facilitating opportunities for commercialization of simulation technologies in Atlantic Canada.

Vision

To enhance education and skills across clinical disciplines and healthcare professions through simulation-based training and assessment.

Mission

- To create a comprehensive surgical simulation program serving a variety of disciplines
- To define and measure knowledge and skill competencies of all learners
- To foster research and commercialization of simulation-based education

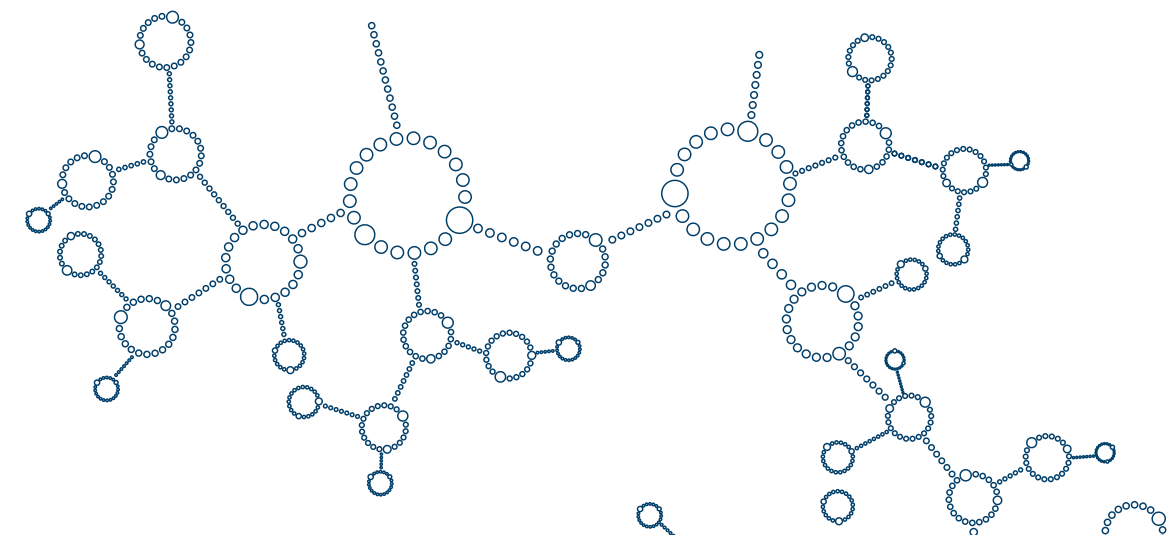
Accomplishments

- Dr. David Clarke was invited to Chair the Royal College of Canada's Innovation and Technology Task Force
- HD quality video-recording equipment and lighting has been installed in the neurosurgical suite of the QEII, which will facilitate development of a simulation platform.
- PeriopSim™, an iPad app for clinicians who need to learn about new surgical devices, instruments and techniques is being developed by Conquer Mobile in collaboration with Dr. David Clarke, Dr. Ryan D'Arcy (Simon Fraser University), Dr. James Bond (Surrey Memorial Hospital), and Denise Lalanne (BIOTEC). PeriopSim™ is available as a free preview version on the App Store.

Research

PeriopSim™ is currently under evaluation for its training utility in surgical teaching programs at Dalhousie University and the QEII HSC.

- **Simulation Training for Neurosurgery Residents:** The PeriopSim™ platform was tested in a pilot study on neurosurgery residents at the Canadian Neurosurgery Rookie Camp in 2014 and 2015.
- **Simulation Training for Perioperative Nurses:** The PeriopSim™ platform is being evaluated in the "100 Nurses" research study to assess the effectiveness of surgical simulation training for perioperative nurses. The study measures the effectiveness of simulation training to increase novice perioperative nurses' ability and confidence in identifying surgical instruments. It will also identify the aspects of simulation that nurses find most useful for learning.



Presentations/Workshop

Clarke DB, Kureshi N, Hong M (Brien S, Quasty M, Kirkpatrick, A). Integrating Simulation Training into Medical Education and Assessment. Royal College Simulation Summit, 2015.

Funding and Grants

\$30,000- Brain Repair Centre- Knowledge Translation Grant. Virtual Reality Neurosurgical Simulation Education and Training. Principle Investigator: **David Clarke**
Co-Investigators: N. Kureshi, M. Hong

\$370,000- ACOA's Business Development Program, Government of Canada. Supporting the development and commercialization of neuro-based technologies intended to effect meaningful change in the treatment of brain disorders and disease as well as train the next generation of neurosurgeons and nurses via neurosurgical teaching simulation. Principal Investigator: **David Clarke**. Co-Investigators: Steven Beyea, Lauren Petley, Tim Bardouille, Denise Lalanne

Team Members:

- Dr. D. Clarke, Neurosurgeon
- Murray Hong, Neurosurgery OR/Technical Specialist
- Ron Hill, Neurosurgery Technology Coordinator
- Lynne Fenerty, Program Manager
- Ginette Thibault-Halman, Program Coordinator
- Nelofar Kureshi, Research Associate

Team Collaborators:

- Dr. Ryan D'Arcy, Department of Computing Science, Simon Fraser University
- Denise Lalanne, BIOTEC



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 referral centre for the treatment of cerebrovascular disorders in Atlantic Canada with extensive experience in surgical and endovascular management of aneurysms and arteriovenous malformations (AVM), and the only centre with a stereotactic radiosurgery program for the treatment of patients with AVMs. The cerebrovascular team meets weekly to review clinical cases and discuss recommendations for a multidisciplinary 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 into 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 endeavours.

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.
- **STAT** – Stenting in the Treatment of Large, Wide-necked or Recurring Intracranial Aneurysm Trial. Currently enrolling.

- **HEAT** – Multicenter randomized controlled trial of new generation Hydrogel coils versus bare platinum coils in the endovascular treatment of intracranial aneurysms. Currently enrolling, 22 subjects enrolled.

- **ESCAPE** – Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on minimizing CT to recanalization times. Five subjects enrolled.

- **NAVIGATE ESUS** – Secondary Prevention of Stroke in Patients with ESUS. Currently enrolling, one subject enrolled.

Ongoing Local Studies

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. Principal Investigator: Dr. GE Pickett. Funding from the Capital Health Research Fund

Intracranial Aneurysm Measurement with Magnetic Resonance Angiography: what is the smallest change that signifies growth? Principal Investigator: Dr. M Schmidt.

Management of Ruptured Intracranial Aneurysms in a Canadian Tertiary Care Centre: clinical outcomes for coiling and clipping over a ten-year period post-ISAT. Principal Investigator: Dr. GE Pickett.

Accomplishments

- Dr. Pickett completed a training course in stereotactic radiosurgery at the University of Pittsburgh Medical Centre, May 11-15, 2015.
- 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. We anticipate that 2016 will see expansion of local research endeavours, and improvements in our stereotactic radiosurgery program.

Publications

Zambonin JL, **Pickett GE**. Management of simultaneous symptomatic bilateral carotid stenosis. *Can J Neurol Sci* 2015;42(4):267-8.

Goyal M, Demchuk AM, Menon BK, et al for the ESCAPE Trial Investigators (including Phillips SJ, Gubitz GJ, Shankar J and **Pickett GE**). Randomized assessment of rapid endovascular treatment of ischemic stroke. *N Engl J Med* 2015; 372: 1019-1030.

Demchuk AM, Goyal M, Menon BK, et al, for the ESCAPE Trial Investigators (including Phillips SJ, Gubitz GJ, Shankar J and **Pickett GE**). Endovascular treatment for Small Core and Anterior circulation Proximal occlusion with Emphasis on minimizing CT to recanalization times (ESCAPE) trial: methodology. *Int J Stroke* 2015; 10: 429-438.

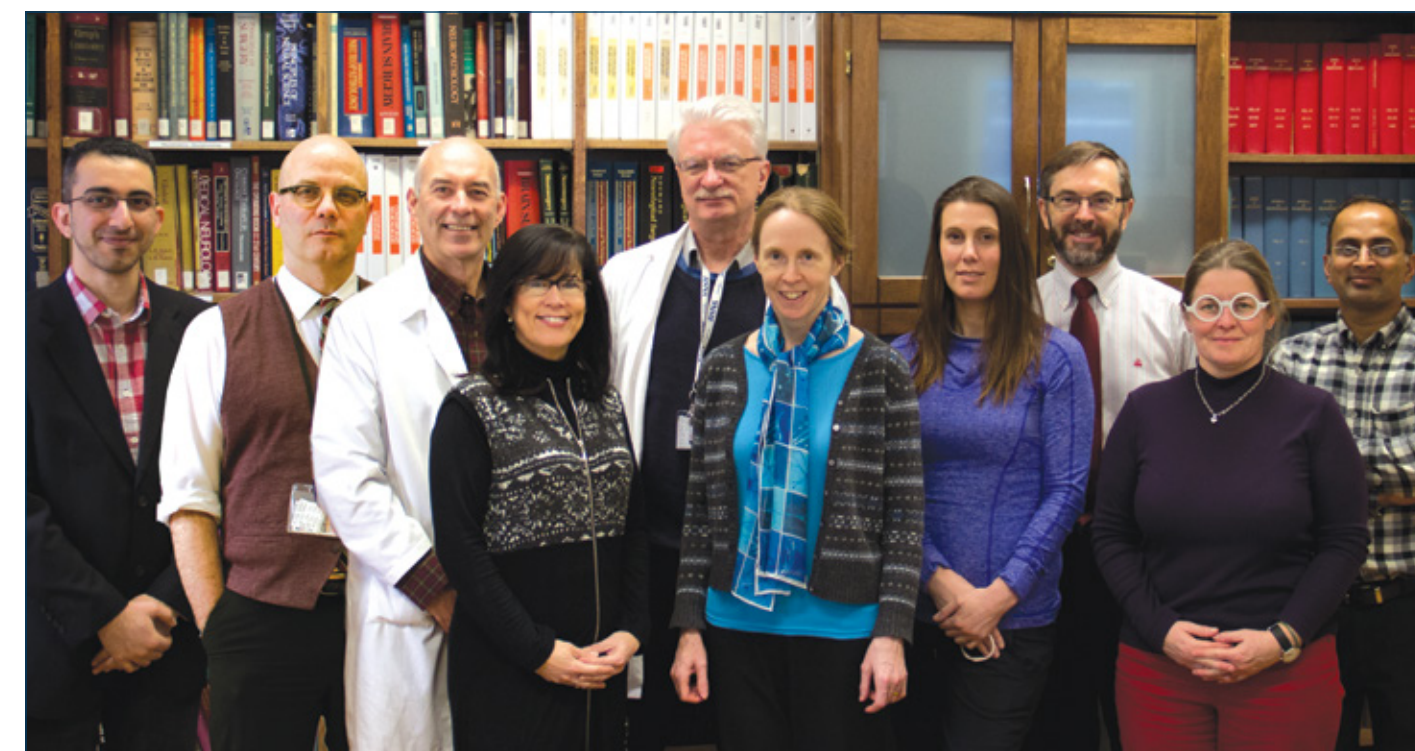
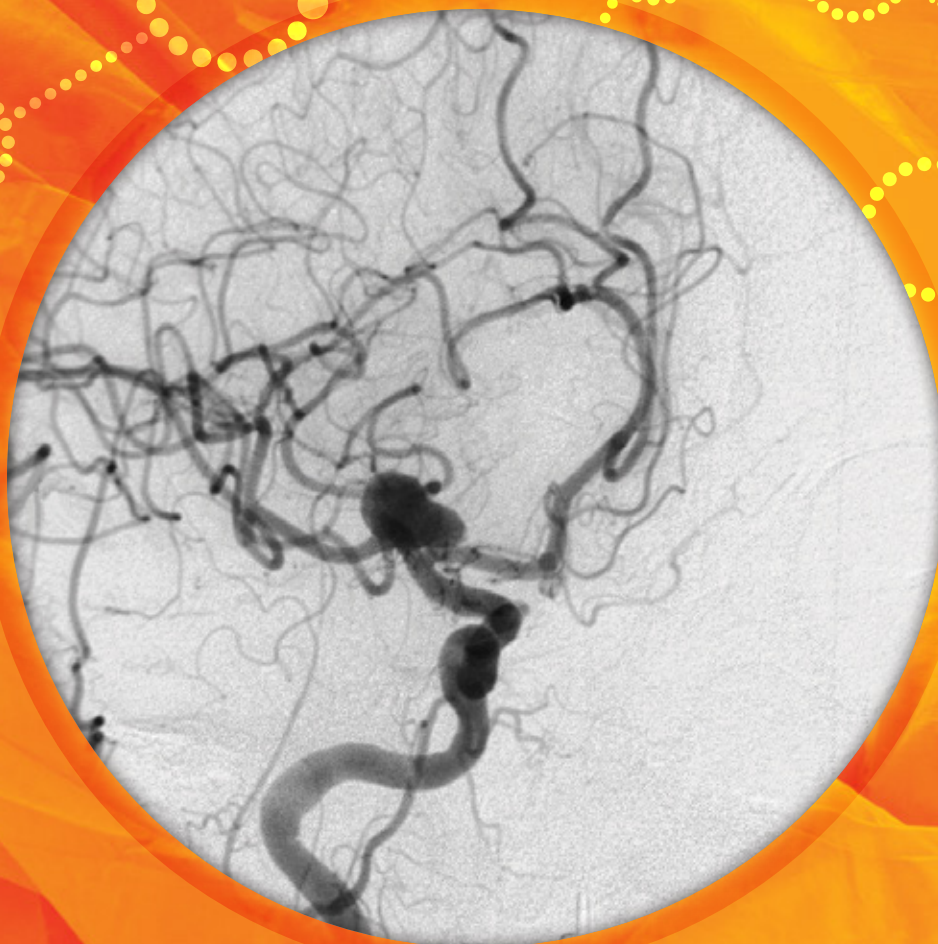
Invited Presentations

Pickett:

Management of Carotid Artery Stenosis. At: Neurology Update X. Co-sponsored by Dalhousie Continuing Medical Education. Sydney, Cape Breton - 6th November 2015.

Team Members & Collaborators:

- Dr. G. Pickett, Director, Neurosurgeon
- Judith Jarrett, Program Coordinator
- Carole-Ann Miller, Specialty Nurse Practitioner
- Dr. A. Weeks, Neurosurgeon
- Dr. G. Gubitz, Neurologist
- Dr. S. Phillips, Neurologist
- Dr. L. Green Neurologist
- Dr. W. Maloney, Neuroradiologist
- Dr. R. Vandorpe, Neuroradiologist
- Dr. M. Schmidt, Neuroradiologist
- Dr. J. Shankar, Neuroradiologist
- Dr. J. Heidenreich, Neuroradiologist
- Dr. A. Al-Habsi, Neurointerventional Fellow
- Dr. A. Quateen, Neurointerventional Fellow



Back (left to right): A. Al-Habsi, Dr. G. Gubitz, Dr. R. Vandorpe, Dr. W. Maloney, Dr. S. Phillips, Dr. J. Shankar
FRONT (LEFT TO RIGHT): C-A Miller, Dr. G. Pickett, Dr. A. Weeks, J. Jarrett

Brain Tumour Program

Program Co-Chairs: Drs. Simon Walling and Adrienne Weeks
Research Coordinator: Andrea Hebb
Brain Tumour Liaison Nurse: Karen Vickers/Missy Brinson

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 Halifax Brain Tumour Support Group holds meetings every 2nd Tuesday of each month at:

The Lodge That Gives,
 5826 South Street
 Halifax, 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:
 - help make informed decisions about brain tumour treatment options;
 - learn about relevant community resources;
 - 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 3500 patients currently entered.

Research Update

Dr. Simon Walling (PI) in collaboration with Dr. Conrad Fernandez (PI) at the IWK, Dr. Adrienne Weeks (Associate Investigator), Dr. Dan McNeely (Associate Investigator) and Andrea L.O. Hebb, (Associate Investigator) in collaboration with Dr. Nada Jabado at McGill University/McGill University Health Center, have received Genome Canada funding of \$50,000.00 for “Biomarkers for Pediatric and Adult High Grade Astrocytoma through Genomics and Epigenomics” 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 under 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 Dr. Adrienne Weeks (PI) and Dr. Simon Walling (PI) and co-investigators Dr. David B. Clarke, Dr. Dan McNeely and Andrea L.O. Hebb, MSc, PhD, RN in collaboration with Dr. Sid Croul, Pathology & Laboratory Medicine.

Team Members:

- Dr. S. Walling, Neurosurgeon, Co-Chair
- Dr. A. Weeks, Neurosurgeon, Co-Chair
- Dr. S. Kirby, Neurologist, Co-Chair
- Dr. D. McNeely, Neurosurgeon
- Dr. D. Clarke, Neurosurgeon
- Dr. G. Pickett, Neurosurgeon
- Missy Brinson, Neurosurgery Brain Tumour Liaison Nurse
- Andrea Hebb, Neurosurgery Research Coordinator
- Dr. S. Croul, Neuropathologist
- Dr. A. Easton, Neuropathologist
- Dr. D. Rheaume, Radiation Oncologist
- Dr. L. Mulroy, Radiation Oncologist
- Dr. M. McNeill, Medical Oncologist
- Dr. M. Schmidt, Neuroradiologist
- Dr. J. Shankar, Neuroradiologist
- Heather MacKenzie, Coordinator, Cancer Care Nova Scotia
- Marlene Sellon, Pharmacist
- Erin Little, Research Coordinator

Neurotrauma and Injury Prevention Programs

Program Co-Leads: Drs. Simon Walling and David Clarke
Program Coordinators: Lynne Fenerty/ Ginette Thibault-Halman/Nelofar Kureshi

Neurotrauma continues to be a leading cause of death and disability in Nova Scotia. The number of major trauma cases provincially continues to increase annually. Nova Scotians suffer major trauma at an annual rate of 1 per 1000 people; among those, 40% are afflicted with a serious traumatic brain injury (TBI). The most common mechanisms of injury are falls (44%) and motor vehicle crashes (27%). Ongoing surveillance demonstrates that there are significant regional variations in the prevalence of major TBI in the province.

The annual economic burden of traumatic injury in Canada and Nova Scotia is estimated at \$26.8 billion and \$790 million respectively. The human cost for patients and families suffering TBI is tremendous, and is particularly tragic given that up to 95% of injuries have a preventable component.

The Neurotrauma and Injury Prevention programs are dedicated to improving traumatic brain injury (TBI) care for patients and families across the spectrum of injury, with an emphasis on knowledge translation. The programs collaborate across multiple sectors 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.
- Collaborate with partners to design and deliver targeted injury prevention strategies and trauma system improvements.

Goals

- Develop evidence-based care pathways to accelerate access to neurosurgical care, reduce lengths of stay and optimize patient outcomes.
- Provide excellence in injury prevention programming and education through an evidence-based approach.
- Support advocacy efforts and enhancement of service provision throughout the spectrum of injury, across the continuum of care from prevention to the community.

Accomplishments

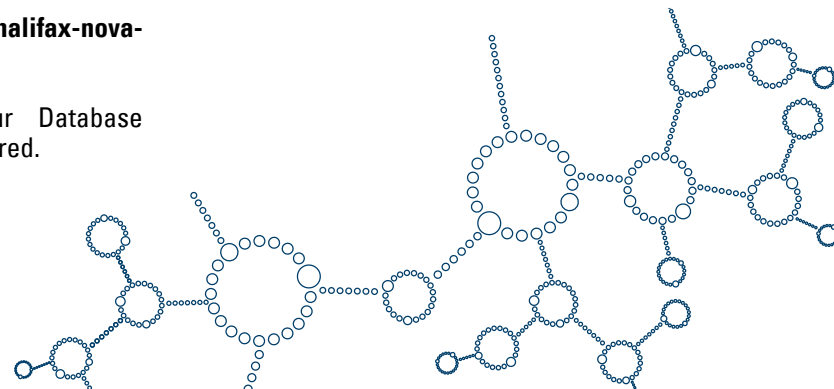
- In partnership with the Nova Scotia Rehabilitation Centre, a telephone follow-up program has been implemented for TBI patients discharged from the neurosurgical unit. A phone interview shortly after discharge provides assessment and support for TBI patients in the community.

- In collaboration with the Neurosurgery Quality Committee, an evidence-based clinical care pathway for TBI patients is under development.
- We are working closely with Case Costing (NSHA-Central Zone) to capture neurotrauma-related surgical costs.
- The Government of Nova Scotia is developing the province's first acquired brain injury (ABI) Strategy. Along with the Department of Health and Wellness, multidisciplinary service providers, and brain injury survivors, we are members of the working group for the development of this strategy.
- In a partnership with the Division of Physical Medicine and Rehabilitation, Department of Family Medicine, and the Department of Emergency Medicine, we are working to develop a multi disciplinary concussion clinic.
- We have partnered with medical students at Dalhousie University for the implementation of “Concussion U”, a concussion interest and education group founded by medical students.
- A Concussion Nova Scotia resource website is being launched. The website will provide a clinical toolkit for concussion management as well as resources for patients and families.

Research

Ongoing Projects:

- All TBI cases admitted to the QEII are reviewed at weekly TBI teaching rounds, chaired by Dr. Clarke. Over 2000 cases have been reviewed to date for inclusion in the TBI database, as well as for quality improvement purposes.
- A retrospective chart review comparing outcomes for different approaches in the management of chronic subdural hematomas has been completed and is in the manuscript preparation phase.
- A multivariate regression analysis has been completed examining their influence of multiple factors on expeditious access to tertiary care. A manuscript is currently in preparation.
- We are members of the Canadian Traumatic Brain Injury Research and Clinical Network, a partnership of Canadian basic and clinician scientists focused on TBI research. Within this group, we are members of the Network's Health Care Utilization Task Force, which will use national administrative datasets to examine TBI patients' usage of health care resources.
- Data from the Quantitative Analysis of Ski and Snowboard Helmet use in Nova Scotia study have resulted in the implementation of the first all-ages Snowsport helmet legislation in the world, resulting in a 100% legislation compliance rate across all ages and ski hills in NS.
- In partnership with the Department of Health and Wellness and the Nova Scotia Trauma Program, we have undertaken an investigation of the incidence and economic burden of alcohol-related traumatic brain injury in Nova Scotia.



Publications

Thibault-Halman G, Fenerty L, Wheadon-Hore K, Walling S, Cusimano MD, Clarke DB. Implementation of an all-ages mandatory helmet policy for ice skating. *Inj Prev.* 2015 Dec;21(6):418-20.

Fenerty, L, Heatley J, Young J, Thibault-Halman G, Kureshi N, Bruce B, Walling S, Clarke DB. Achieving All-Age Helmet Use Compliance for Snow Sports: Strategic use of Education, Legislation, and Enforcement. *Inj Prev.* (in press).

Conference Presentations

Moores M, **Fenerty L, Thibault-Halman G, Kureshi N, Walling S, Clarke DB.** Use of drains versus no drains after burr-hole evacuation of chronic subdural hematoma. Canadian Neurological Sciences Federation Toronto, Ontario, 2015.

Fenerty L and Heatley J.A multisectorial approach to achieving all age snow sport legislation in Nova Scotia. Atlantic Collaboration on Injury Prevention Halifax, Nova Scotia, 2015.

Baker E, **Fenerty L, Atkinson T, Backman J, Germain I, Thornley N, Liu J.** Panel on concussion. Brain Injury Canada Semi-annual Conference, Halifax, Nova Scotia, 2015.

Fenerty L. All age helmet legislation for skiing and snowboarding; a multifaceted approach for the prevention of brain injury in Nova Scotia. Brain Injury Canada Semi-annual Conference, Halifax, Nova Scotia, 2015.

Community Presentations

Christie S, Thibault-Halman G. ThinkFirst Brain and Spinal Cord Injury Prevention Program, Kingwood Elementary School, Hammonds Plains, NS, June 2015.

Thibault-Halman G. ThinkFirst Brain and Spinal Cord Injury Prevention Program, École Bois-Joli, Dartmouth, NS, June 2015. Fenerty L. Dalhousie University Environmental Health and Safety Expo, October 2015.

Fenerty L. Brain Injury Association of Nova Scotia – Concussion Support Group, June 2015.

Team Members:

- Dr. D. Clarke, Neurosurgeon
- Dr. S. Walling, Neurosurgeon
- Lynne Fenerty, Program Coordinator
- Ginette Thibault-Halman, Program Coordinator
- Nelofar Kureshi, Research Associate
- Maggie Moores, Student

Speakers Bureau:

- Joe Lively, Injury Survivor
- Paula Dunn, RN (IWK)

Team Collaborators:

- Department of Emergency Medicine
- Department of Physical Medicine and Rehabilitation
- Division of Critical Care
- Emergency Health Services
- Nova Scotia Trauma Program
- Finance Services, Case Costing (NSHA-Central Zone)
- Concussion Nova Scotia
- Atlantic Collaborative for Injury Prevention
- Brain Injury Association of Nova Scotia
- Canadian Tire Canada
- Child Safety Link
- Dalhousie School of Nursing
- Department of Health Promotion and Protection
- Injury Free Nova Scotia
- Nova Scotia Ski Hill Operators
- Parachute (ThinkFirst) Canada



BACK ROW: Dr. S. Walling, Dr. D. Clarke
FRONT ROW: M. Moores, N. Kureshi, G. Thibault-Halman, L. Fenerty

Halifax Neuropituitary Program



Program Co-Chairs: Drs. David B. Clarke and Ali Imran
Research Coordinator: Andrea Hebb

Mission

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

Objectives

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

This program, unique to the Atlantic Provinces and much of Canada, provides comprehensive care to over 1700 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 have increased tremendously, with 47 new HNP surgical referrals, to include Newfoundland and 121 new HNP medical referrals, representing a substantial increase in the number of patients seen in 2014 from previous years.

Twenty-seven transsphenoidal surgeries were performed endoscopically in 2015 by Drs. Clarke (Neurosurgery) and Massoud (Otolaryngology).

In addition, we have treated our 6th patient, as part of our Health Canada approved clinical trial on the stereotactic intracavitary instillation of ⁹⁰yttrium for treatment of cystic sellar/parasellar lesions. We also imaged ⁹⁰yttrium within the cyst by PET scan. The clinical trial is being performed in collaboration with Dr. Steven Burrell and Dr. George Mawko in the Department of Diagnostic Imaging QEII Health Sciences Centre for treatment of HNP patients with cystic lesions.

Education

Invited Speakers:

Dr. David Clarke: Cushing Support Group, Halifax, NS, "Transsphenoidal Surgery and Cushing's", Future Inn, Halifax, NS, October 2, 2015.

Drs. Ali Imran (Co-Chair) and David Clarke: Pillar Pituitary Preceptorship Program for Canadian Endocrinologists, Toronto, ON, "Pituitary Tumors: a Surgical Perspective", September 11-12, 2015.

Dr. David Clarke: Acromegaly Support Group, "Halifax Neuropituitary Program", Future Inn, Halifax, NS, June 5, 2015.

Dr. David Clarke, Dr. Ali Imran and Dr. Emad Massoud were invited speakers at the "Atlantic Acromegaly Support Group: Celebrating 10 Years", Victoria General Hospital, Halifax, NS, October 16, 2015.

Poster presentation:

Khaled M AlDahmani, Churn-Ern Yip, Chris Theriault, Steve Doucette, Syed Mohammed Imran, Fatima Imran, **David B. Clarke** and **Syed Ali Imran**. "Epidemiology of Sellar Tumors in the Province of Nova Scotia, Canada", 65th Annual Congress of Neurological Surgeons, New Orleans, Louisiana, Sept 25-30, 2015.

Research/Program Development

We held our **HNP Retreat** at White Point Beach Lodge on **June 25, 2015**.

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

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 six patients. In collaboration with Dr. Steve Burrell and Dr. George Mawko, we are the first group to use PET to visualize ⁹⁰yttrium colloid within the cyst. An initial manuscript (see below) has been accepted for publication.

Capital Health Research Fund "Non-functioning pituitary adenomas biomarkers" was approved for funding in 2014 and we are actively recruiting patients.

Team Members:

- Dr. D. Clarke, Neurosurgeon
- Dr. A. Imran, Endocrinologist
- Dr. E. Massoud, Otolaryngologist
- Dr. A. Mishra, Ophthalmologist
- Dr. C. Yip, Endocrinologist
- Dr. D. Zwicker, Endocrinologist- Sydney, NS
- Dr. A. McGibbon, Endocrinologist- Fredericton, NB
- Lisa Tramble, Endocrinology Clinic Nurse
- Andrea Hebb, Research Coordinator
- Raven Glasgow, Program Clinic Coordinator
- Dr. S. Croul, Neuropathologist
- Dr. S. Burrell, Diagnostic Radiologist
- Dr. G. Mawko, Diagnostic Radiologist

The Stereotactic Radiosurgery Group:

- Dr. L. Mulroy, Radiation Oncology
- Dr. D. Rheume, Radiation Oncology

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. Manohar Bance, David Morris and Simon Walling Andrea Hebb: Research Coordinator Clinic Coordinator: Jackie Seagers

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, acoustic neuromas and a range of other lateral skull base tumours.

The program provides coordinated care to over 650 patients with a range of lateral skull base tumours including vestibular schwannomas, other cerebellopontine angle 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), and balance and hearing rehabilitation. This program is unique in Canada in allowing members from all disciplines to formulate management decisions in the same clinic.

NF2 Clinics continue to be held once every 2nd month. This clinic is dedicated to patients with Neurofibromatosis Type 2 and includes collaboration with Medical Genetics, Radiology, Nova Scotia Hearing and Speech as well as Ophthalmology.

Our program referrals have increased tremendously, with 59 new Maritime Lateral SBC referrals, to include 14 from New Brunswick and 4 from PEI, representing a substantial increase in the number of patients seen in 2014 from previous years. Three hundred and fifty clinic visits occurred in 2015.

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

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

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

Publication

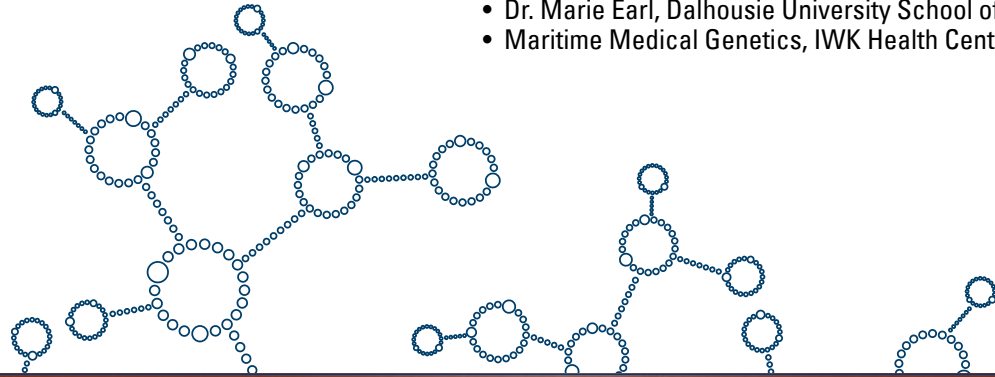
Elliott A, Hebb AL, Walling S, Morris DP, Bance M. Hearing preservation in vestibular schwannoma management. Am J Otolaryngol. 2015;36(4):526-34.

Team Members:

- Dr. Simon Walling, Neurosurgeon
- Dr. Manohar Bance, Otolaryngologist
- Dr. David P. Morris, Otolaryngologist
- Andrea Hebb, Research Coordinator
- Jackie Seagers, Clinic Coordinator

The Stereotactic Radiosurgery Team

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



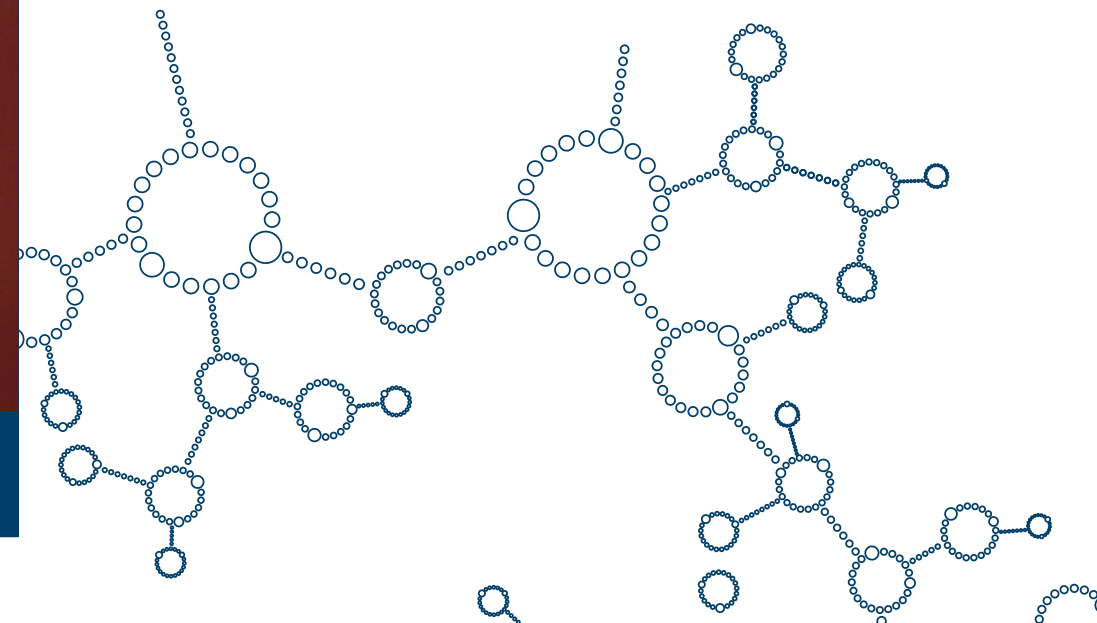
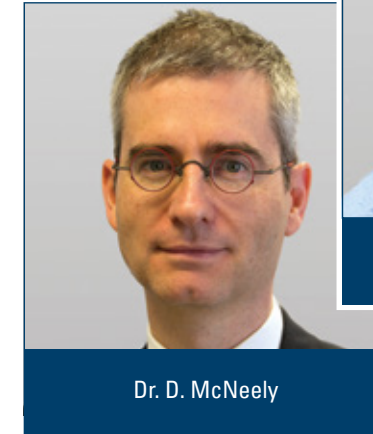
BACK ROW: Dr. M. Brace, Dr. D. Morris, Dr. B. Wickens
FRONT ROW: A. Hebb, Dr. M. Bance, J. Seagers, Dr. S. Walling

Pediatric Neurosurgery

This was another busy year for Neurosurgery at the IWK Health Centre. Our goal 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.

Team Members and Collaborators:

- Dr. P. Daniel McNeely, Chief, Pediatric Neurosurgery
- Dr. Simon A. Walling, Neurosurgery
- Marie MacNeil, Neurosurgery Clinic Nurse
- Kelly Boileau, Brain Tumour Clinic Nurse
- Sheila Coutts, Craniofacial Clinic Nurse
- Janet Woods, Neurosurgery OR Nursing Team Lead
- Dr. Susan Morris, Neurophysiologist
- Cathy Caron, Administrative Assistant
- Chrissy Shay, Administrative Assistant
- Steve Van-Iderstine, Research Associate
- Pediatric Neurology
- Pediatric Anesthesia
- Pediatric Neuroradiology
- Pediatric Critical Care
- Neonatology
- Neuropsychology
- Pediatric Hematology Oncology
- Radiation Oncology
- Neuropathology
- Pediatric Orthopedics
- Pediatric General Surgery
- Pediatric Urology
- Plastic and Reconstructive Surgery



Neurosurgery Technology Program

**Ron Hill –
Technology Coordinator**

OR Lights

2015 saw a big change in the look and function of our OR13. A state-of-the-art lighting and visualization system was installed. The system consists of the latest in LED lighting technology for a more consistent, brighter light with minimal shadowing. HD Cameras are located in the light handle and on an independent articulating arm. Three boom mounted monitors are integrated into a video switching system that allows us to receive and send signals from any surgical video display device such as a microscope or C-Arm, as well as our hospital PACS imaging system. These video and camera inputs can be recorded to a video and still capture system. This setup provides for a less cluttered and more effective operative space as well as providing better visualization for training surgical residents.

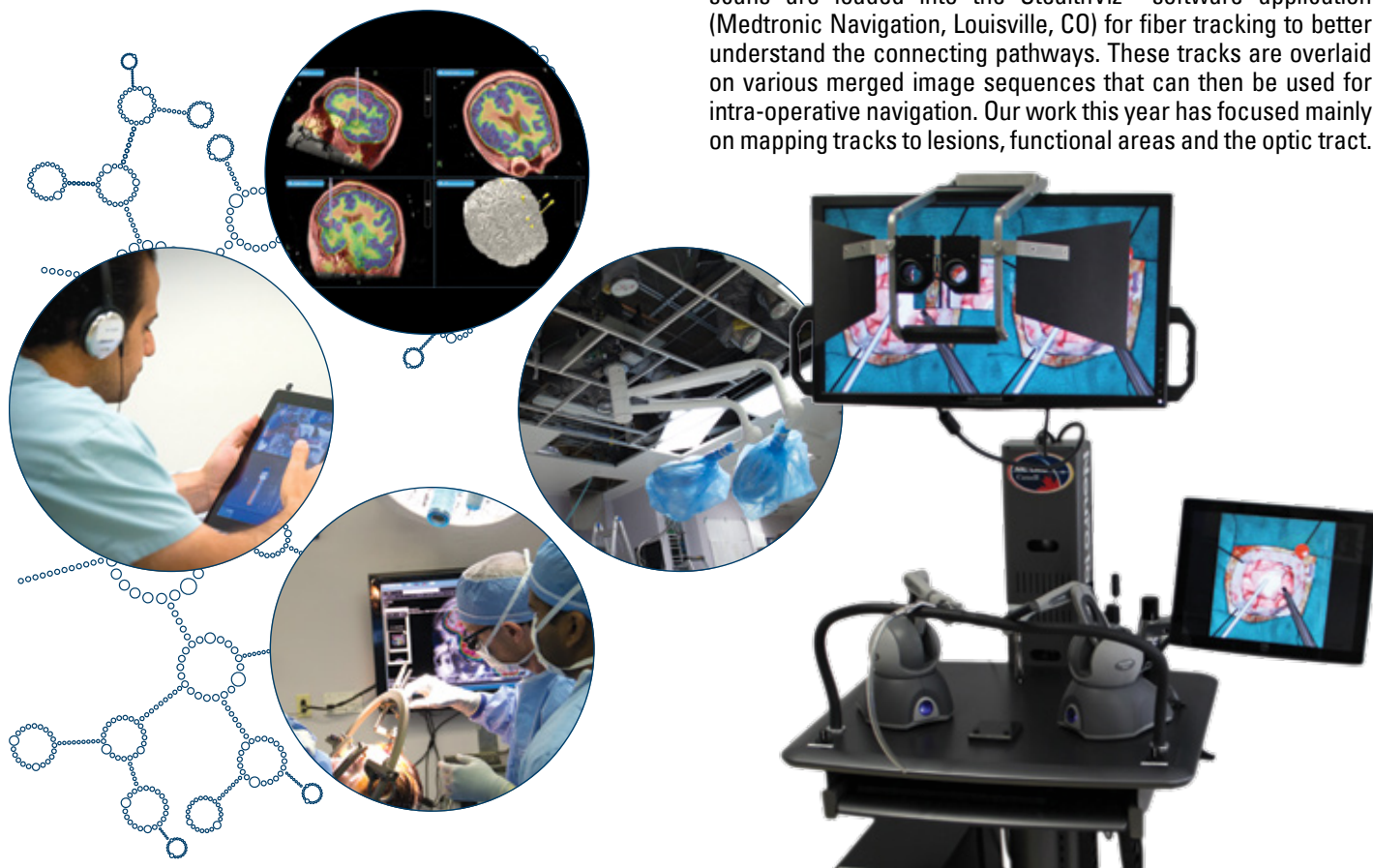
Virtual Reality (VR) Lab

The Virtual Reality Lab was renovated with improved lighting and customizable workspaces. PeriopSim applications have been the main focus in the VR lab. In parallel to the IOS focused PeriopSim we are developing a 3D version using the Oculus VR headset and STEM controllers for a full VR immersive environment. The project is being headed by Conquer Mobile in conjunction with Sixense, the developers of the STEM controllers. Initial funding for these projects was provided through a ACOA's Business Development Program (BDP) grant (Principle Investigator: Dr. D. Clarke). The NeuroTouch is a virtual reality surgery simulator designed to train residents and hone the skills of experienced surgeons. As part of our Residency Program, we continue to develop and evaluate surgical scenarios.

Imaging and Image Guided Surgery

We continue to investigate 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. Our work this year has focused mainly on mapping tracks to lesions, functional areas and the optic tract.



Intraoperative Neurophysiological Monitoring (IONM)

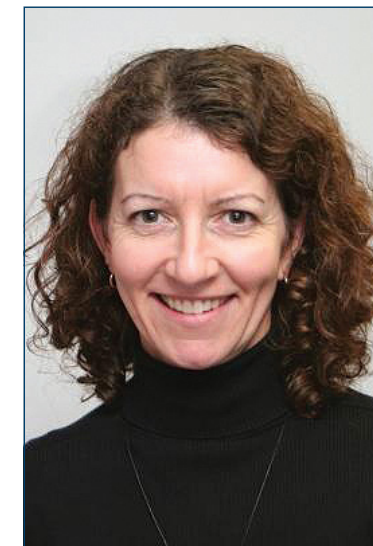
Intraoperative neurophysiological monitoring (IONM) uses electrophysiological techniques to provide ongoing feedback about brain and spinal cord function during higher risk neurosurgeries. IONM acts as an early warning signal, enabling timely intraoperative intervention and avoidance of post-operative deficits such as paralysis. Neurosurgeries that most benefit from IONM include brain and spinal cord tumour resections and complex spinal deformity corrections. In addition to providing critical warnings about nervous system status, IONM can be used as an intraoperative mapping and guidance tool to complement imaging studies such as MRI.

The IONM program in the Division of Neurosurgery is run by Dr. Susan Morris, an experienced neurophysiologist, working alongside Dr. Murray Hong.

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.

Publications

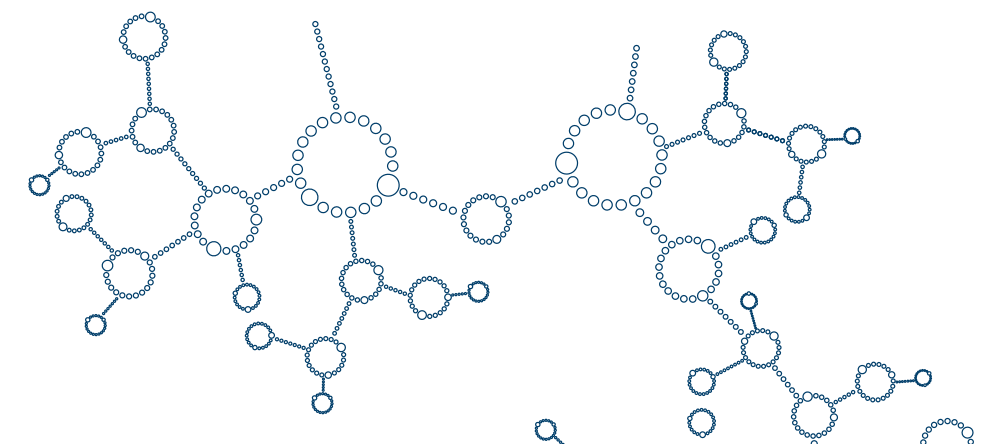
Morris SH, Howard JJ, Rasmuson DD, El-Hawary R. Validity of transcranial motor evoked potentials as early indicators of neural compromise in rat model of spinal cord compression. Spine (Phila Pa 1976). 2015 Apr 15; 40(8):E492-7.



SUSAN MORRIS

PhD

**Neurophysiologist,
Intraoperative
Neurophysiological
Monitoring**



Neurosurgery Basic Science Labs

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

Spinal Cord Injury Laboratory

Dr. Sean Christie

Dr. Christie's lab has a number of research initiatives aimed at elaborating our understanding of CNS injury, from both cellular and genetic perspectives. This year marks a continuation of exciting partnership projects with local private industry and the development of modernized protocols for whole tissue imaging of spine and brain tissue. We have also secured Department of Surgery seed funding for our collaborative pig model of spinal cord injury. Our current research projects are as follows:

- Screening for changes in microRNA programming in the context of spinal injury. MicroRNAs are small (22 nucleotide) genetic regulators that exert widespread changes on the transcriptional activity of the genome. The ability of a single class of microRNA to regulate a large number of target genes makes the use of microRNAs an exciting therapeutic prospect. Using Next Generation Deep Sequencing services, we hope to identify key microRNA programs that are critical for the initiation and propagation of secondary spinal cord injury. We are currently collecting tissue for screening from a number of species, including pigs, transgenic reporter mice and human cell lines.
- Adaptation of methodologies for whole tissue analysis in the context of neural injury – Conventional methods of tissue preparation have typically involved the fixation and sectioning of specimens, followed by a process of imaging, and reconstruction of digitized sections. To circumvent the artifactual and labour-intensive nature of this approach, we are working on adapting a recently developed method of tissue clearing, termed CUBIC, for use in spinal cord and brain analysis. By rendering the normally opaque CNS tissue clear, we are able to visualize neuronal injury at the single cell level, using whole-tissue laser scanning confocal microscopy.

- Characterization of blood flow autoregulation in pigs. Although blood flow autoregulation and reperfusion kinetics have been well characterized in the brain, less is known about this process in the human spinal cord. The pig spinal cord exhibits a remarkably similar size and genetic composition to that seen in humans. This year, we have secured funds to generate a detailed view of autoregulatory responses in the pig spinal cord, following augmentation of blood pressure. This analysis will use multi-spectral fluorescent microspheres, flow cytometry, and laser scanning confocal microscopy techniques.
- Development of a novel model of spinal cord injury in pigs. Our collaboration with Dr. Michael Schmidt (Anesthesia) and Dr. Susan Morris is entering its fourth year. This procedure uses neurophysiological monitoring, total intravenous anesthesia and neurosurgical techniques in order to perform a precisely graded compression injury. Tissue procured from spinalized pigs is then used for a number of follow-up analyses (lipid peroxidation and microRNA screening) and serves as a proxy to the genetic and anatomical landscape seen in humans.
- Development of methodologies for identifying and analyzing spinal cells that are sensitive to secondary spinal injury progression. Following an initial mechanical trauma to the spinal cord, there is a progressive cascade of cell death that involves changes in the biochemical and genetic climate of cells in proximity to the injury site. This "secondary spinal cord injury" mechanism is a central theme of our lab. To date, we have been characterizing a novel class of lipid peroxidation sensor for use in screening injured animal spinal tissue for early secondary injury events. The ability to isolate and enrich cells that exhibit sensitivity to secondary spinal cord injury allows us to screen for changes in gene regulation that may be central to the progression of this disease. In order to generate a more complete view of gene regulation across a number of cellular contexts, we perform this research in a variety of animal and cell line models, including pig, transgenic mouse, rat and human cells.

Motor Control Laboratory

Dr. Robert Brownstone

<http://www.medicine.dal.ca/research/motorcontrol.html>

Dr. Robert Brownstone established the Motor Control Laboratory in 2000, after joining Dalhousie Medical School from the University of Manitoba. In 2012, he and his research team relocated the lab from the medical school's original research tower to the new Life Sciences Research Institute. Dr. Brownstone and his colleagues have established a state-of-the-art neuroscience research facility.

The primary goal of the lab is to identify and characterize neural circuits that control movement. Understanding these circuits is critical for the development of strategies that will lead to improvements in quality of life in people with peripheral nerve or spinal cord injuries or other diseases of their nervous system that impair their ability to move. Diverse techniques are used to study central nervous system circuits, including electrophysiology, multiphoton microscopy, molecular biology, immunohistochemistry and computer modelling.

We work in close collaboration with research teams in adjacent labs that are also pursuing solutions to mobility problems as part of the Atlantic Mobility Action Project (www.amap.ca). This proximity enables the active sharing of resources and cross-pollination of ideas to create a vibrant atmosphere of discovery.

Brain Tumour Laboratory

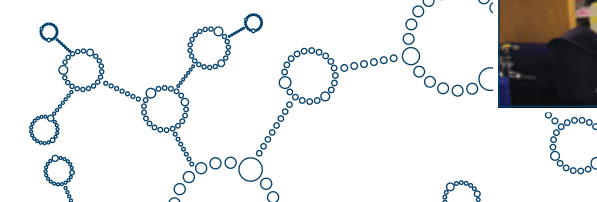
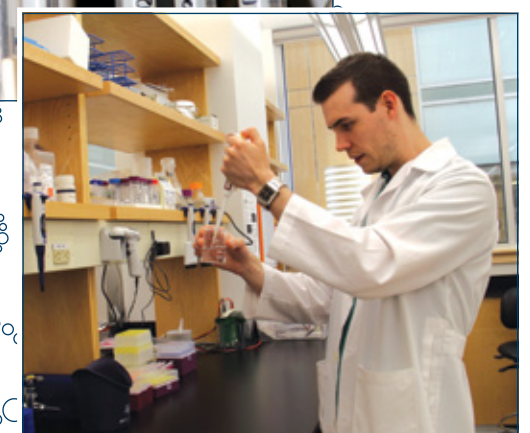
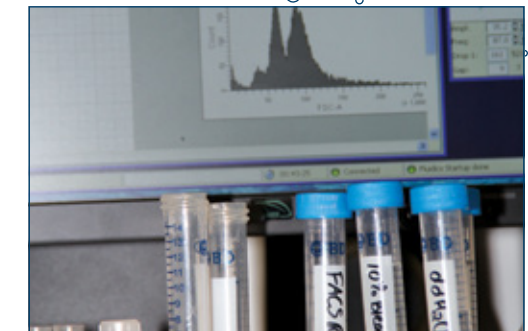
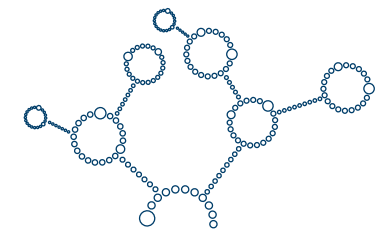
Dr. Adrienne Weeks

Dr. Weeks is establishing a basic science laboratory to investigate molecular mechanisms underlying treatment-resistant brain tumour growth.

Neuron Survival & Regeneration Laboratory

Dr. David Clarke

The Neuron Survival and Regeneration Laboratory focuses on understanding the neuronal response and developing strategies aimed at enhancing the survival and regeneration of injured neurons. We are currently examining the role of cell surface molecules on survival of injured neurons and using genetic knockout models to examine functions of specific molecules.



Neurosurgery Funding

(PI = Principal Investigator)

Dr. Rob Brownstone (PI)

2014-2019
Canadian Institutes of Health Research
Control of Movement: Reticulospinal Circuits
\$780,611

Dr. Rob Brownstone (PI)

2014-2019
Canadian Institutes of Health Research
Control of Movement: Spinal Cord Motor Circuits
\$961,325

Dr. Rob Brownstone (PI)

2012-2019
Canada Research Chair in Spinal Cord Circuits
\$1,400,000

Dr. Rob Brownstone (PI)

2010-2015
Canadian Institutes of Health Research
Control of movement: Regulation of Spinal-Muscular Circuits
\$833,775

Dr. Sean Christie (Co-Investigator)

2012-2015
Rick Hansen Institute
Canadian Multicentre Cerebrospinal Fluid Pressure Monitoring and Biomarker Study
\$240,925.00

Dr. Sean Christie (Co-Investigator)

2008-2016
Rick Hansen Institute
Rick Hansen Spinal Cord Injury Registry
\$312,000

Dr. Sean Christie (Co-Investigator)

2015-2018
Rick Hansen Institute
Minocycline in Acute Spinal Cord Injury Study
\$263,200

Dr. Sean Christie (PI)

2014-2015
Medtronic of Canada, Ltd.
Unrestricted research grant
\$40,000

Dr. David Clarke (Co-Investigator and several others) PI: Jamie Hutchison

2015-2018
Brain Canada Platform Support Grant (Matching contributions provided by the Division of Neurosurgery, the Department of Surgery and Capital Health)
A National Biobank and Database for Patients with Traumatic Brain Injury
\$3,000,000

Dr. David Clarke (PI)

Co-Investigators: Steven Beyea, Lauren Petley, Tim Bardouille, Denise Lalanne
2015-2018
ACOA's 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
\$370,000

Dr. David Clarke (PI)

2011-2015
Natural Sciences and Engineering Research Council (NSERC), NCAM influences RGC numbers: Mechanisms and Implications for Vision
\$150,000

Dr. David Clarke (PI)

Co-Investigators: Nelofar Kureshi, Murray Hong
2015
Brain Repair Centre- Knowledge Translation Grant, Dalhousie University
Virtual Reality Neurosurgical Simulation Education and Training
\$30,000

Dr. David Clarke (PI)

Co-Investigators: Simon Walling, Lynne Fenerty, Ginette Thibault-Halman, Nelofar Kureshi, Rob Green

2013-2015
Department of Health Promotion and Protection
Quantitative Investigation of the Cost of Alcohol Positive Traumatic Brain Injury (TBI) in Nova Scotia (NS)
\$20,000

Dr. David Clarke

**(Co-Investigator and several others)
PIs: Jamie Hutchison, Alexis Turgeon
(co-leads)**

2015-2019
Canadian Institute of Health Research and Ontario Neurotrauma Foundation
Canadian Traumatic Brain Injury Research Consortium (CTRC) Grant
\$1,824,513

Drs. David Clarke and Simon Walling (Co-Investigators)

PI: Jai Shankar also with Sultan Darvesh
2015
Nova Scotia Health Research Foundation REDI Catalyst Award
Acquiring Imaging Post-processing Software for CT and MR Perfusion and MR Diffusion Research Studies at QEII Health Sciences Centre
\$20,000

Dr. Gwynedd Pickett (Co-PI, with Jai Shankar)

2014-2015
Capital Health Research Fund
CTPIPS - CT Perfusion Imaging to Predict Vasospasm in Subarachnoid Hemorrhage
\$15,000

Dr. Gwynedd Pickett (PI)

2014-2015
CURES - The Canadian Unruptured Endovascular Coiling versus Surgical Clipping Trial
\$6000

Dr. Gwynedd Pickett (Co-Investigator and several others) PI: Jai Shankar

2014-2015
HEAT - Multicenter Randomized Controlled Trial of New Generation Hydrogel Coils versus Bare Platinum Coils in the Endovascular Treatment of Intracranial Aneurysms.
\$82,800

Dr. Simon Walling (Co-Investigator)

Co-Investigators: N. Jabad, C. Fernandez
2015
Genome Canada
Biomarkers for Pediatric and Adult High Grade Astrocytoma through Genomics and Epigenomics.
\$50,000

Dr. Adrienne Weeks (PI)

2014-2015
Beatrice Hunter Cancer Institute Research Seed Grant
\$50,000

Dr. Adrienne Weeks (PI)

2014-2016
Department of Surgery
Seed Grant
\$150,000

Dr. Adrienne Weeks (PI)

2015
Dalhousie Medical Research Foundation (DMRF)
Equipment Grant
\$15,000

Publications

Ahn H, Bailey CS, Rivers CS, Noonan VK, Tsai EC, Fournay DR, Attabib N, Kwon BK, **Christie SD**, Fehlings MG, Finkelstein J, Hurlbert RJ, Townson A, Parent S, Drew B, Chen J, Dvorak MF; Rick Hansen Spinal Cord Injury Registry Network. Effect of older age on treatment decisions and outcomes among patients with traumatic spinal cord injury. *CMAJ*. 2015 Sep 8; 187(12):873-80.

Ailon T, Dunham C, Carret AS, Tabori U, **McNeely PD**, Zelcer S, Wilson B, Lafay-Cousin L, Johnston D, Eisenstat DD, Silva M, Jabado N, Goddard KJ, Fryer C, Henderson G, Hawkins C, Dunn S, Yip S, Singhal A, Hukin J. The role of resection alone in select children with intracranial ependymoma: the Canadian Pediatric Brain Tumour Consortium experience. *Childs Nerv Syst*. 2015 Jan; 31(1):57-65.

Al-Dahmani K, Mohammad S, Imran F, Theriault C, Doucette S, Zwicker D, Yip CE, **Clarke DB**, Imran SA. Sellar Masses: An Epidemiological Study. *Canadian Journal Neurological Sciences*, 2015 Nov 2:1-7.

Barry S, Dakson A. A case of chronic lower extremity weakness with ascending numbness and myelopathy. *Spinal Columns*. May 2015 Volume 15, Number 2.

Borgström F, Beall DP, Berven S, Boonen S, **Christie S**, Kallmes DF, Kanis JA, Olafsson G, Singer AJ, Åkesson K. Health economic aspects of vertebral augmentation procedures. *Osteoporos Int*. 2015 Apr;26(4):1239-49.

Brandman DM, Haji FA, Matte MC, **Clarke DB**. Needs Assessment for Incoming PGY-1 Residents in Neurosurgical Residency. *Canadian Journal Neurological Sciences*. 2015 Jan;42(1):17-24.

Dakson A, McNeely PD. Circle of Willis: as seen during endoscopic fenestration of a suprasellar arachnoid cyst. *BMJ Case Rep*. 2015 Jun 8.

Demchuk AM, Goyal M, Menon BK, et al, for the ESCAPE Trial Investigators (including Phillips SJ, Gubitz GJ, Shankar J and **Pickett GE**). Endovascular treatment for Small Core and Anterior circulation Proximal occlusion with Emphasis on minimizing CT to recanalization times (ESCAPE) trial: methodology. *Int J Stroke* 2015; 10: 429-438.

Dvorak MF, Noonan VK, Fallah N, Fisher CG, Finkelstein J, Kwon BK, Rivers CS, Ahn H, Paquet J, Tsai EC, Townson A, Attabib N, Bailey CS, **Christie SD**, Drew B, Fournay DR, Fox R, Hurlbert RJ, Johnson MG, Linassi AG, Parent S, Fehlings MG; RHSCIR Network. The influence of time from injury to surgery on motor recovery and length of hospital stay in acute traumatic spinal cord injury: an observational Canadian cohort study. *J Neurotrauma*. 2015 May 1;32 (9):645-54.

Elliott A, **Hebb AL, Walling S**, Morris DP, Bance M. Hearing preservation in vestibular schwannoma management. *Am J Otolaryngol*. 2015 Jul-Aug;36 (4):526-34.

Evaniew N, Noonan VK, Fallah N, Kwon BK, Rivers CS, Ahn H, Bailey CS, **Christie SD**, Fournay DR, Hurlbert RJ, Linassi AG, Fehlings MG, Dvorak MF. Methylprednisolone for the Treatment of Patients with Acute Spinal Cord Injuries: A Propensity Score-Matched Cohort Study from a Canadian Multi-Center Spinal Cord Injury Registry. *J Neurotrauma*. 2015 Nov 1; 32(21):1674-83.

Fehlings MG, **Barry S**, Kopjar B, Yoon ST, Arnold P, Massicotte EM, Vaccaro A, Brodke DS, Shaffrey C, Smith JS, Woodard E, Banco RJ, Chapman J, Janssen M, Bono C, Sasso R, Dekutoski M, Gokaslan ZL. In Response. *Spine(Phila Pa 1976)*. 2014 Jul 1; 39(15):1265.

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Ferguson C, **Walling S**, Easton A, Shankar JJ. Fourth Ventricle Choroid Plexus Xanthogranuloma Causing Hydrocephalus. *Canadian Journal Neurological Sciences*, 2015 Nov; 42(6):454-6.

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Li AM, Dunham C, Tabori U, Carret AS, **McNeely PD**, Johnston D, Lafay-Cousin L, Wilson B, Eisenstat DD, Jabado N, Zelcer S, Silva M, Scheinemann K, Fryer C, Henderson G, Fotovati A, Hawkins C, Yip S, Dunn SE, Hukin J. EZH2 expression is a prognostic factor in childhood intracranial ependymoma: a Canadian Pediatric Brain Tumour Consortium study. *Cancer*. 2015 May 1; 121(9):1499-507.

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Radic JA, Vincer M, **McNeely PD**. Temporal trends of intraventricular hemorrhage of prematurity in Nova Scotia from 1993 to 2012. *J Neurosurg Pediatr*. 2015 Jun; 15(6):573-9.

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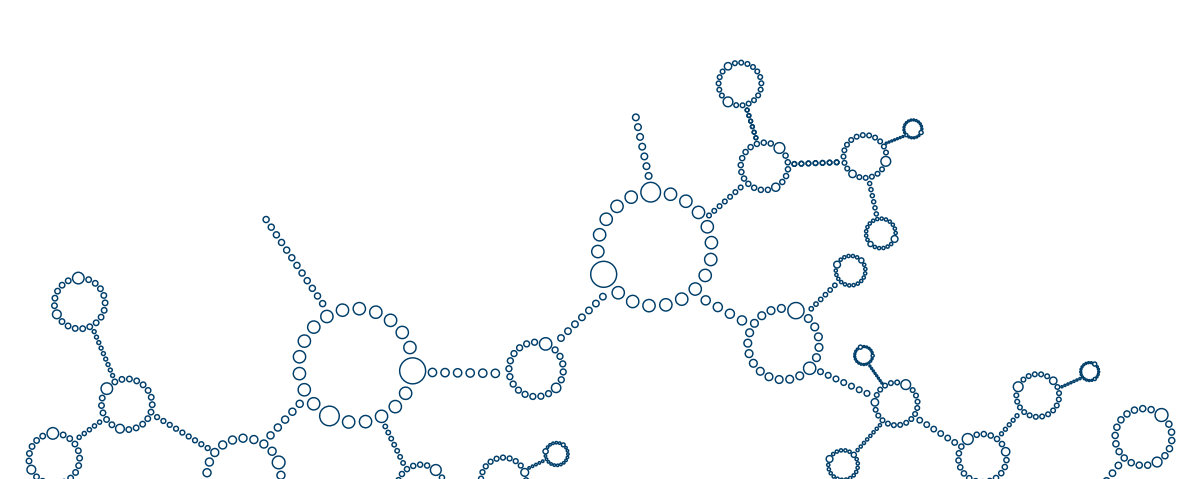
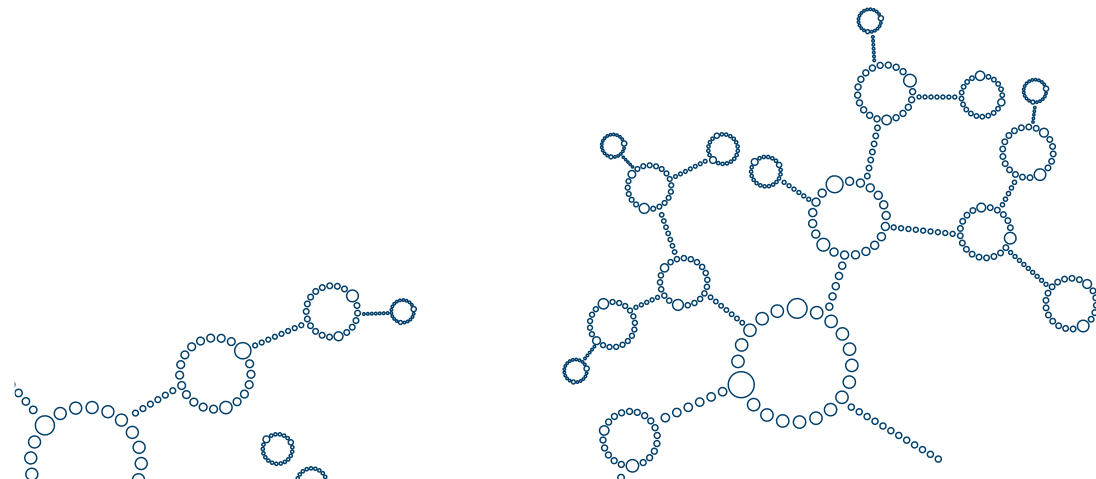
Robichaud A, Clarke DB, O'Kelly C, Beed M, Brindley P. Acute Care SINS: Surgical Insights for the Non-surgeon, Chapter 13: Spine Surgery, SINS. *Canadian Journal of General Internal Medicine*. 2015, Volume 10, Issue 4.

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Zamboni JL, **Pickett GE**. Management of simultaneous symptomatic bilateral carotid stenosis. *Can J Neurol Sci* 2015; 42(4):267-8.



Presentations

Afzal S, Romao R, Crooks B, Rutledge R, Penney L, Bernstein M, Rashid R, **McNeely D**, Tabori U. The Role of Surveillance in Families with Biallelic Mismatch Repair Deficiency Syndrome: Case Report of Two Siblings with Multiple Colon Adenocarcinoma and Brain Tumour. Poster presentation at 48th Congress of the International Society for Paediatric Oncology, Cape Town, South Africa, 2015.

Afzal S, Crooks B, Rutledge R, Walling S, **McNeely D**. Tumour with Abundant Neuropil and True Rosettes (ETANTR): Long Term Survival in a Child Treated with Intensive Chemotherapy and Peripheral Blood Stem Cell Rescue. Poster presentation at 48th Congress of the International Society for Paediatric Oncology, Cape Town, South Africa, 2015.

Al-Dahmani KM, Yip CE, Theriault C, Doucette S, Mohammed S, Imran F, **Clarke DB**, Imran SA. Epidemiology of Sellar Masses in Province of Nova Scotia, Canada. The Endocrine Society's 97th Annual Meeting & Expo, San Diego, California, 2015.

Al-Dahmani K, Mohammad S, Imran F, Theriault C, Doucette S, Zwicker D, Yip C, Imran SA, **Clarke DB**. Epidemiology of Sellar Tumours in the Province of Nova Scotia, Canada. 65th Annual Congress of Neurological Surgeons, New Orleans, Louisiana, 2015.

Fenerty L, Heatley J, **Kureshi N**, **Thibault-Halman G**, Young J, **Walling S**, **Clarke DB**. All Age Helmet Legislation for Skiing and Snowboarding; a Multifaceted Approach for the Prevention of Brain Injury in Nova Scotia. The Canadian Brain Injury Association Conference, Halifax, Nova Scotia, 2015.

Imran SA, Tiemensma J, Kaiser SM, Vallis M, Doucette S, Abidi E, Yip CE, Tugwell BD, Siddiqi F, **Clarke DB**. An Association Between Visual Morphometric Changes and Psychiatric Outcomes in Patients with Acromegaly. Society for Endocrinology BES 2015, Edinburgh, UK, 2015.

Larouche J, Paquette S, Fisher C, Domisse I, Wadey V, Hall H, Finkelstein J, Bouchard J, Hurlbert J, Broad R, Fox R, Hedden D, Nataraj A, Carey T, Bailey C, Chapman M, Moroz P, Chow D, Wai E, Tsai E, **Christie S**, Lundine K, Paquet J, Splawinski J, Wheelock B, Goytan M, Ahn H, Massicotte E, Fehlings M and Yee A. "Development of a Canadian Competency-Based Spine Surgery Fellowship Education Curriculum". 15th Annual Scientific Conference of the Canadian Spine Society, Halifax, NS, 2015.

Moores M, **Fenerty L**, **Thibault-Halman G**, **Kureshi N**, **Walling S**, **Clarke DB**. Use of Drains Versus No Drains After Burr-hole Evacuation of Chronic Subdural Hematoma. Canadian Neurological Sciences Federation, Toronto, Ontario, 2015.

Moores M, **Fenerty L**, **Thibault-Halman G**, **Kureshi N**, **Walling S**, **Clarke DB**. Chronic Subdural Neurosurgical Management: To Drain or Not to Drain? Dalhousie University Clinical Neuroscience Research Day, Halifax, Nova Scotia, 2015.

Invited Lectures

Barry, S. CRAM Neurosurgery Head Injury Review. Dalhousie Medical Class of 2016. Halifax, NS, 2015.

Christie, S. ThinkFirst Brain and Spinal Cord Injury Prevention Program, Kingwood Elementary School, Hammonds Plains, NS. 2015

Christie, S. Pragmatic best evidence that you need to know for your practice. 10th Annual Canadian Contemporary Spinal Techniques. Toronto, ON, 2015.

Christie, S. Spine Care in Canada: Practice Enhancement. Moving Towards National Consensus. 10th Annual Canadian Contemporary Spinal Techniques Course. Toronto, ON, 2015.

Christie S. Is there a role for kyphoplasty in traumatic fractures? Canadian Motion Preservation Meeting. Montreal, QC, 2015.

Christie S. Cervical Arthroplasty: Does it make sense? Canadian Neurological Sciences Federation. Toronto, ON, 2015.

Christie, S. Critical Care of Spinal Cord Injury. Caribbean Neurosciences Symposium. Montego Bay, Jamaica, 2015.

Clarke, DB. QEII Foundation Academic Neurosciences Program Reception. Halifax, NS, 2015.

Clarke, DB. Pituitary Tumours: a Surgical Perspective. Pillar Pituitary Preceptorship Program for Canadian Endocrinologists. Toronto, ON, 2015.

Clarke, DB. OR Nursing Simulation. Halifax, NS, 2015.

Clarke, DB. Initial Diagnosis and Management of Traumatic Brain Injury. Emergency Health Services, Paramedic Performance and Development Division. Dartmouth, NS, 2015.

Clarke, DB. Failures in Epilepsy Surgery. Canadian Neurological Sciences Federation 2015 Congress. Toronto, ON, 2015.

Clarke, DB. Epilepsy Surgery, A Surgeon's Perspective. St. John's Neurosurgery/Neurology Rounds, General Hospital Health Sciences Centre. St. John's, NL, 2015.

Clarke, DB. Initial Diagnosis and Management of Traumatic Brain Injury. Traumatic Brain Injury Trauma Webinar, Nova Scotia Health Authority. Halifax, NS, 2015.

Clarke, DB. Epilepsy and Surgical Management. 3rd Annual Ottawa Neurosurgery Review Course. Ottawa, ON, 2015.

Clarke, DB. Transsphenoidal Surgery and Cushing's. Cushing Support Group. Halifax, NS, 2015

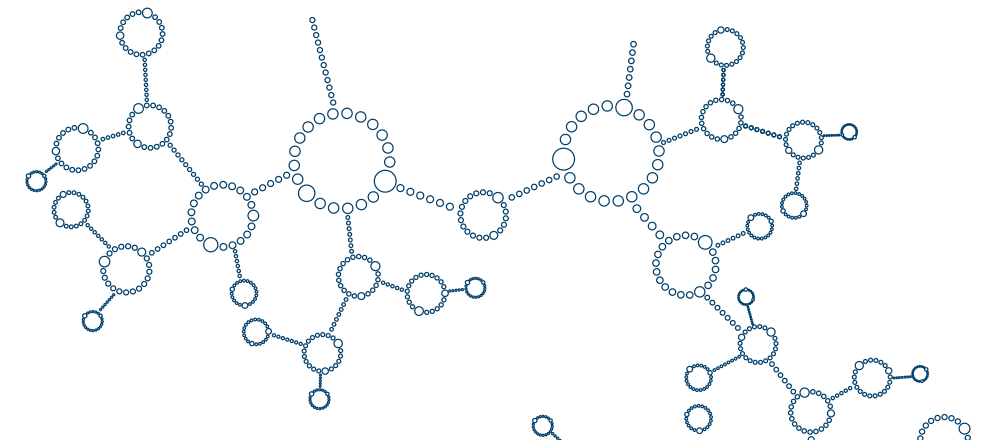
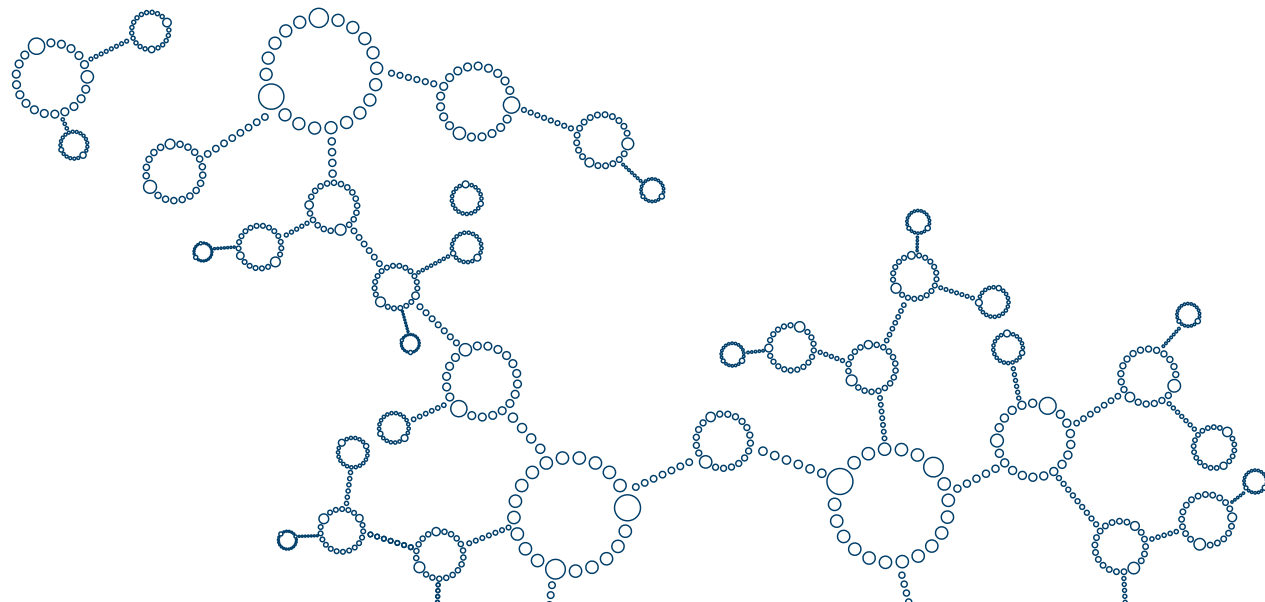
Clarke, DB. Halifax Neuroendocrine Program: Acromegaly: A Surgical Perspective. Acromegaly Support Group. Halifax, NS, 2015

McNeely, D. Hydrocephalus and the Emergency Department. IWK Health Centre Emergency Department Rounds, June 24, 2015.

McNeely, D. Neonatal Neurosurgery. Neonatal Emergency Team Orientation Course. IWK Health Centre, April 9, 2015.

McNeely, D. Neurosurgery Essentials for the Pediatric Resident. Pediatrics academic half-day, IWK Health Centre, April 7, 2015.

Pickett, G. Management of Carotid Artery Stenosis. Neurology Update. Co-sponsored by Dalhousie Continuing Medical Education. Sydney, NS, 2015.



Neurosurgery Residency Training Program

Dr. Dan McNeely – Director Tiffany Webber – Program Coordinator

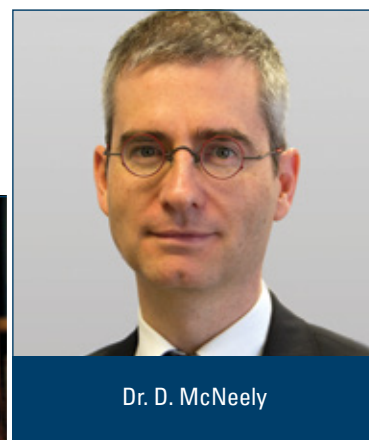
The major objective of the Neurosurgery Residency Training Program at Dalhousie is the development of neurosurgeons who will excel in clinical care and possess all of the skills required to pursue an academic career or community practice. This is achieved by exposure to a broad range of technical problem solving and decision making aspects of neurosurgery over a six-year period. Residents begin training with graduated levels of responsibility in the care of neurosurgical patients, assuming greater responsibility of technical procedures and inpatient care as their training progresses. At the Senior Resident level, independent clinical and operative decision making is promoted and 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 to perfect their decision-making skills. Regular teaching rounds and seminars promote resident involvement in discussion of current issues with interaction between residents and attending staff. The emphasis on academic components in the program prepares residents for success in the Royal College Examinations and for laying down the foundation for those who want to develop an academic career.

The Neurosurgery Residency Training Program at Dalhousie includes clinical rotations at the QEII Health Sciences Centre and the IWK Health Centre in Halifax, Nova Scotia, and the Saint John Regional Hospital in Saint John, New Brunswick. This provides residents with exposure to a wide variety of neurosurgical problems, management approaches and excellent academic and clinical education experiences.

The Division of Neurosurgery promotes the role of research in residency training through research programs involving basic research and clinical investigation. There is a commitment to develop a multidisciplinary approach to research involving clinicians and basic scientists. We encourage residents who wish to pursue graduate studies to enrol in the Clinician Investigator Program. Currently there are eight neurosurgery trainees in this program.

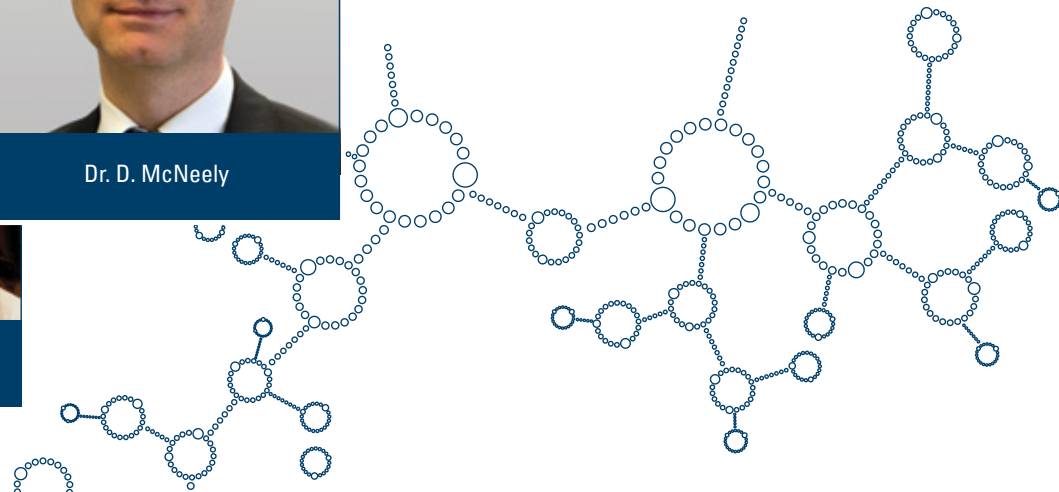
Finally, since 2011, we have welcomed visiting neurosurgery residents from the University of West Indies, Kingston, Jamaica. We have been enriched by this experience, and are pleased to have them in our midst.



Dr. D. McNeely



T. Webber



Neurosurgery Rookie Camp

Camp Director: Dr. David Clarke The Canadian Neurosurgery Rookie Camp: Training the next generation of Canada's Neurosurgeons

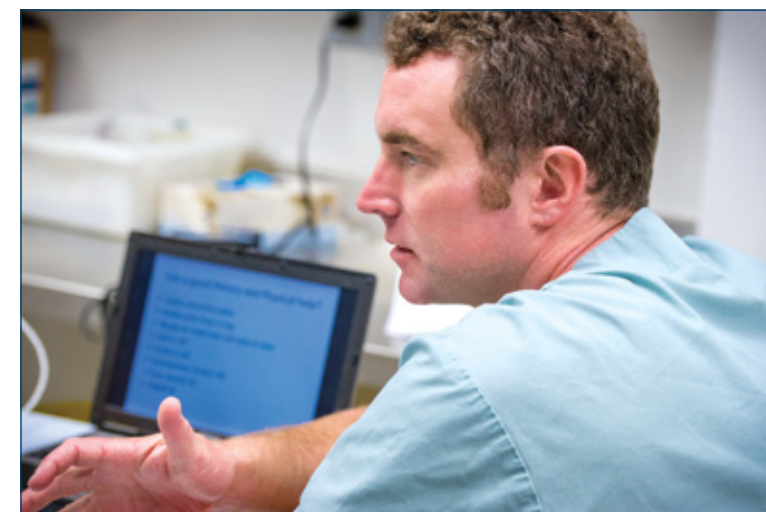
After three years of hosting the Annual Canadian Neurosurgery Rookie Camp in Halifax, Dr. David Clarke, Founder and Camp Director, was excited to receive feedback that other academic centres across Canada demonstrated an interest in hosting the event. The Division of Neurosurgery, University of Alberta, was chosen to host the 4th Annual Canadian Neurosurgery Rookie Camp with Dr. Cian O'Kelly as Camp Host. On July 10 and 11, 2015, the Camp was held at the Surgical Medical Research Institute, University of Alberta, in Edmonton.

The Rookie Camp is a uniquely Canadian program that provides a learning-intensive environment and successful initiation for neurosurgery residents from across Canada who are beginning their six-year training program. Based on real patient scenarios, they are introduced to the technical, cognitive and behavioural skills needed in neurosurgery, a field that often involves high-stakes and life-and-death situations where efficient decision making is crucial.

Camp material is developed collaboratively by experts from across the country, with top-notch teaching faculty attending the event from various institutions. Dr. Sean Barry spearheaded updating the Rookie Camp Website. Faculty and residents representing virtually every training program across Canada were in attendance. Teaching Faculty from Halifax Neurosurgery at the 2015 Rookie Camp included Dr. Sean Barry, Dr. David Clarke and Murray Hong. Our PGY 1 residents Drs. Heidi Goodbout and Omar AlSharif, participated.

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, J&J Codman, KLS Martin, Storz, Integra Canada and the Canadian Neurosurgical Society. We are also appreciative of the simulation technology provided by Conquer Mobile Inc.

Visit www.neurosurgeryrookie.ca



Guest Speakers

Dr. Jeff Wilson

Department of Surgery, Neurosurgery
University of Toronto, Ontario

Presentation: Traumatic Spinal Cord Injury: Acute Surgical Management and Predicting the Future

Dr. Nir Lipsman

Department of Surgery, Neurosurgery
University of Toronto, Ontario

Presentation: Brain Circuitry and Human Behaviour: What can go wrong and what can we do about it?

Dr. Alasdair Coles

Department of Medicine, Neurology (Neuroimmunology)
University of Cambridge, UK

Presentation: The development of alemtuzumab as a treatment for multiple sclerosis. The inside story

Dr. David Grimes

Department of Medicine, Neurology (Chief)
University of Ottawa, Ottawa

Presentation: Differential Diagnosis of Hypokinetic Movement Disorders

Dr. Falah Maroun

Department of Surgery, Neurosurgery
Memorial University of Newfoundland

Presentation: A vanishing breed and the changing face of neurosurgery

Dr. Mark Freedman

Department of Medicine, Neurology
University of Ottawa, Ottawa

Presentation: Stem cell therapy in multiple sclerosis

Dr. Nathan Rowland

Department of Surgery, Neurosurgery (Fellowship)
Toronto Western Hospital, Ontario

Presentation: The Future Parkinson's disease patient: Cortical Physiology and the Landscape of Next Generation Therapies

Dr. Giridhar Kalamangalam

Department of Medicine, Neurology
The University of Texas, Houston

Presentation: The relevance of new imaging and EEG techniques in epilepsy

Dr. Lutz Weise

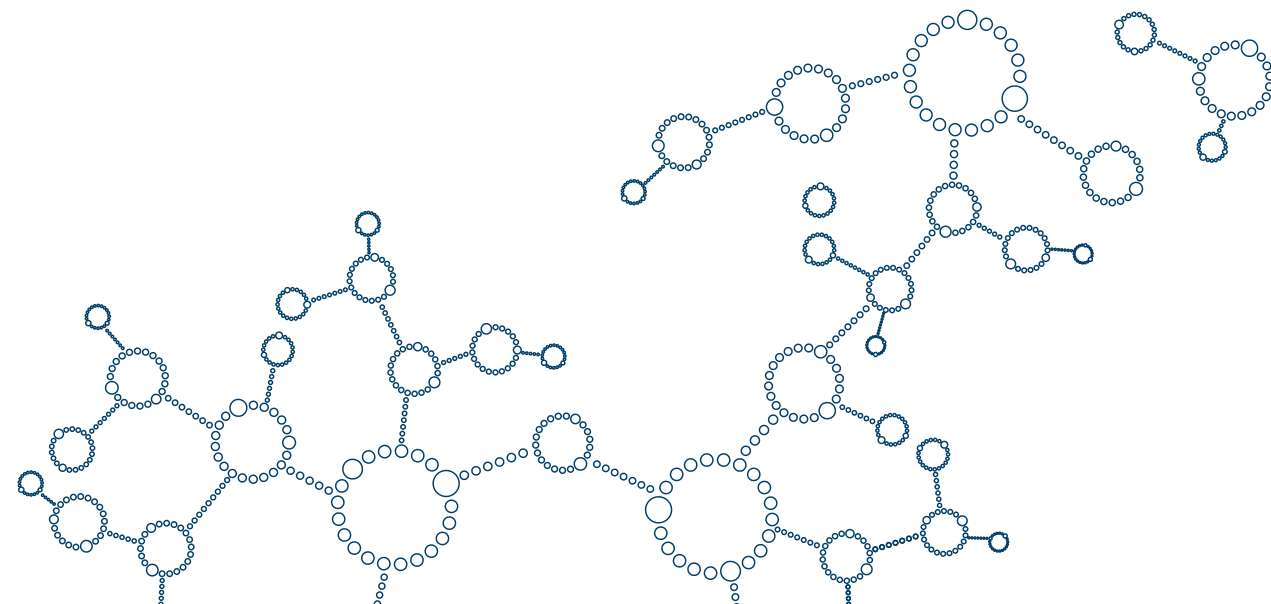
Department of Surgery, Neurosurgery
Goethe University, Frankfurt, Germany

Presentation: The role of Tractography in Deep Brain Stimulation

Dr. Tejas Sankar

Department of Surgery, Neurosurgery
University Edmonton, Alberta

Presentation: Deep Brain Stimulation: where are we now and where are we headed?



Awards and Recognitions

Dr. Phillipe Magown, Resident

Neurosurgery Research and Education Foundation (NREF) Research Grant Fellowship Award

The NREF award is an American not-for-profit organization created by the American Association of Neurological Surgeons (AANS) to support research and education in neurological surgery.

Department of Surgery Best Work in Fundamental Science

This award is presented by the Dalhousie Medical Alumni Association at the Faculty of Medicine, Resident Research Awards.

W.D Stevenson Award Recipient

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

Dr. David Brandman, Resident

Dalhousie Medical Research Foundation (DMRF) Harold and Ruth Babcock Award

This award is presented to Dalhousie surgical residents.

Dalhousie University Clinical Investigators Program Award

The Dalhousie University Clinician Investigator Program (CIP) is an accredited postgraduate medical education training program of the Royal College of Physicians and Surgeons of Canada.

Canadian Institute of Health Research (CHIR) Award

Neurotrauma and Injury Prevention Programs

Provincial Acquired Brain Injury Strategy

The Government of Nova Scotia, in its work to develop an Acquired Brain Injury (ABI) Strategy, has chosen to work with Neurosurgery as well as the Department of Health and Wellness, multidisciplinary service providers, and brain injury survivors.

Neurosurgery Simulation Program –

Dr. David Clarke

ACOA's Business Development Program, Government of Canada Award

Supporting the development and commercialization of simulation technologies that will be used to train the next generation of neurosurgeons and nurses.

Dr. Gwynedd Pickett, Neurosurgeon

President and Chair of the 46th Atlantic Clinical Neurosciences Society Conference and Annual General Meeting

Halifax, Nova Scotia, May 8-9, 2015

Karina Rankka, Health Service Manager, Ambulatory Clinics (Neurosurgery Clinic)

1st Place in the STARLIGHT Challenge, Canadian Forces

Karina is member of the Canadian Forces serving with "33 Field Ambulance" in Halifax. Karina was the team captain in this competition, a medical skills and military skills competition that involved 15 teams across Canada. First place earned Karina's team an opportunity to represent Canada in a competition in England.

Neurosurgery OR Dragon Boat Team –

Brain Power

1st Place Healthcare Division - Annual Manulife Dragon Boat Race

The team consists of a multidisciplinary neurosurgery operating room staff.

Affiliated Unit



LEFT TO RIGHT:
Dr. A. leRoux, Dr. G. Kolyvas, Dr. B. Wheelock, Dr. N. Attabib

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

The Division of Neurosurgery at the Saint John Regional Hospital consists of 4 neurosurgeons with Dr. George Kolyvas as Department Head. Other department members include:

- Dr. Al-Shayji, with an interest in skull base and vascular surgery
- Dr. N. Attabib, residency program director, with special interest in complex spine surgery
- Dr. le Roux, with a special interest in skull base and vascular surgery

All department members have current faculty appointments with Dalhousie.

This year the division celebrated the happy retirement of Dr. Brian Wheelock after decades for positive contribution to Neurosurgery locally and nationally

The bulk of our practice is in general adult neurosurgery with special areas of expertise and interest as noted in this report. The department collaborates with the Moncton neurosurgical group: our new SRS program supplies this service and Moncton provides complex neuroendovascular service to the province. The two neurosurgical groups meet on a regular basis to discuss common interests; we are both part of the Horizon Health neuroscience and rehabilitation network.

The division is strengthened substantially by dedicated neuroscience nurses. Janice Kenney is the neurosurgical case manager and aides in the care of our patients with special responsibility for patient and family relationships. Patti Gallagher is our Clinical Nurse Specialist and unit manager. Carolyn Crawford coordinates our intrathecal spasticity program. Derek Gaudet is our research coordinator.

There are some areas of our program we would like to highlight for this report.

Postgraduate

Saint John neurosurgery is the major affiliate with the Dalhousie neurosurgery residency program; the rotation in Saint John is a mandatory rotation and part of the core training.

During this rotation the residents are exposed to variety of clinical cases including operative experience in complex and minimally invasive spine, skull base and cerebrovascular surgery. There is exposure to a variety of trauma, neuro-oncology and radiosurgery cases. The residents are required to actively participate in a variety of academic activities and teaching rounds during their rotation.

The Dalhousie Neurosurgery residents do this rotation at the Saint John Regional hospital, which is the largest tertiary and general hospital in the province. It is the level 1 trauma center for the province.

Undergraduate

Our neurosurgery group is actively involved with the New Brunswick Dalhousie Medical School program, participating in the Neuroscience teaching, professional competencies, and elective rotation for all four years of undergraduate study.

Residents and Medical students are actively involved in neurosurgery research. The Research in Medicine (RIM) program is an example of research collaboration between the department and the faculty of Medicine.

Stereotactic Radiosurgery (SRS)

The SRS program treated its first patient in November, 2012. This is a LINAC based program delivered by a Varian Trilogy using BrainLab software at the Saint John Regional Hospital. We treated close to 60 cases of different pathology brain lesions.

The team is multidisciplinary. Dr. Naz and Dr. Mohiuddin from Radiation Oncology, and Dr. Attabib and Dr. Le Roux from Neurosurgery collaborate with the physicists, technologists and nurses of the Horizon Oncology team to deliver this service. Patients are referred from all of New Brunswick and discussed at a regular SRS round. We continue to collaborate with the Halifax SRS program.

These patients have had single or multiple metastases or acoustic schwannomas. We intend to expand our indications for SRS as we gain more experience.

Research

Our group is actively contributing to research in the following areas:

- The Rick Hansen Spinal Cord Injury Registry (RHSCIR) focuses on collecting data related to traumatic spinal cord injury. The Co-Investigator is Dr. Najmedden Attabib.
- The Canadian Spine Outcomes Research Network (CSORN) database is designed to gather and maintain information on patients diagnosed with a spinal pathology requiring surgical or non-surgical intervention. This database focuses on specific outcomes of surgical and non-surgical techniques used to treat patients with spinal pathologies
- Mentoring Dalhousie Medical students in research projects through the RIM and elective programs. One student has successfully finished her project on Spinal cord injury in New Brunswick, and three other students are starting their research this year.

Submissions and pending projects

1. Traumatic Cauda Equina Syndrome (tCES) in collaboration with Rick Hansen group. PI Dr. Attabib and Dr. O'Connell
2. Diluted Povidone Iodine Irrigation in Spine Surgery trial (recruiting). Drs. Attabib, Kolyvas, Abraham, Alshayji, Le Roux and Wheelock

3. The neurosurgery department has also been developing new studies that will examine psychological aspects of recovery within a population of traumatic spinal cord injury survivors. Dr. Attabib
4. Epidemiology of traumatic spinal cord injury in New Brunswick submitted to the CNFS annual meeting
5. GBM in the Pineal region/Posterior Third ventricle: manuscript completed, currently being submitted for publication (Ducan Bowes, Andre le Roux, Ayman Alshayji)
6. Paper on Intraventricular Pilocytic Astrocytoma and review of literature: Manuscript in final stages of review prior to submission (Andre Le Roux, George Kolyvas, Brian Wheelock)
7. Ongoing data collection on Chronic Subdural Hematoma treatment - an analysis on outcome with different drainage techniques: This is prospective (dating from 2010) and is near the end of data collection phase (Andre Le Roux, Najmedden Attabib, Ayman Alshayji, George Kolyvas, Brian Wheelock)
8. Brain Tumour Map of NB (Med Student + Andre) RIM project
9. Head Injuries as seen at SJRH ER - 4 yr review (Med Student + Andre) RIM project
10. RIM Student project: SRS in NB (Med Student + Andre) RIM project
11. CRASH III - we are enrolled but currently not recruiting (George Kolyvas, Najmedden Attabib, Ayman Alshayji, Andre Le Roux)

Databases

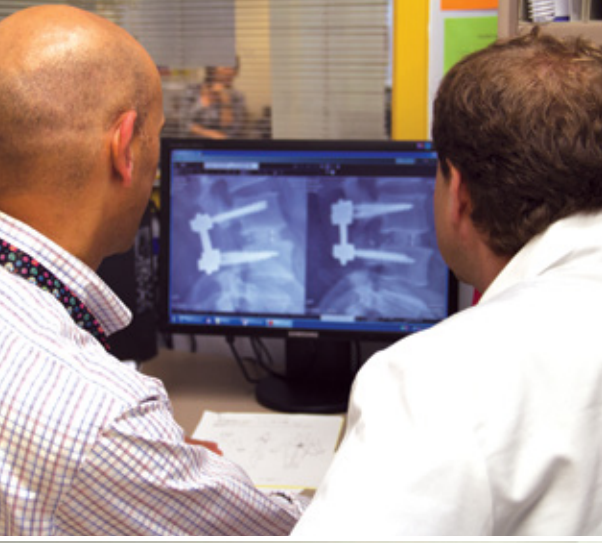
- The Departmental database is maintained by Janice Kinney Case Manager and Dr. Andre Le Roux
- Neurosurgery Departmental Data Base (Diagnosis)
- M&M Data Base (Intra / post op complications)
- Departmental neuro-oncology database

Publications

Effect of older age on treatment decisions and outcomes among patients with traumatic spinal cord injury. Ahn H, Bailey CS, Rivers CS, Noonan VK, Tsai EC, Fournay DR, **Attabib N**, Kwon BK, **Christie SD**, Fehlings MG, Finkelstein J, Hurlbert RJ, Townson A, Parent S, Drew B, Chen J, Dvorak MF; Rick Hansen Spinal Cord Injury Registry Network. CMAJ. 2015 Sep 8;187(12):873-80.

The influence of time from injury to surgery on motor recovery and length of hospital stay in acute traumatic spinal cord injury: an observational Canadian cohort study. Dvorak MF, Noonan VK, Fallah N, Fisher CG, Finkelstein J, Kwon BK, Rivers CS, Ahn H, Paquet J, Tsai EC, Townson A, **Attabib N**, Bailey CS, **Christie SD**, Drew B, Fournay DR, Fox R, Hurlbert RJ, Johnson MG, Linassi AG, Parent S, Fehlings MG; RHSCIR Network. J Neurotrauma. 2015 May 1;32(9):645-54.

Halifax Neurosurgery



Cross-Appointed Faculty

Department of Anaesthesia

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
 Dr. Jai Shankar, MD, DM, MSc

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 Rheume, 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. Manohar Bance, MB, MSc., FRCSC
 Dr. Robert Hart, MD FRCS (C)
 Dr. Jonathan Trites, MD, FRCSC

Neurosurgery Administration Staff

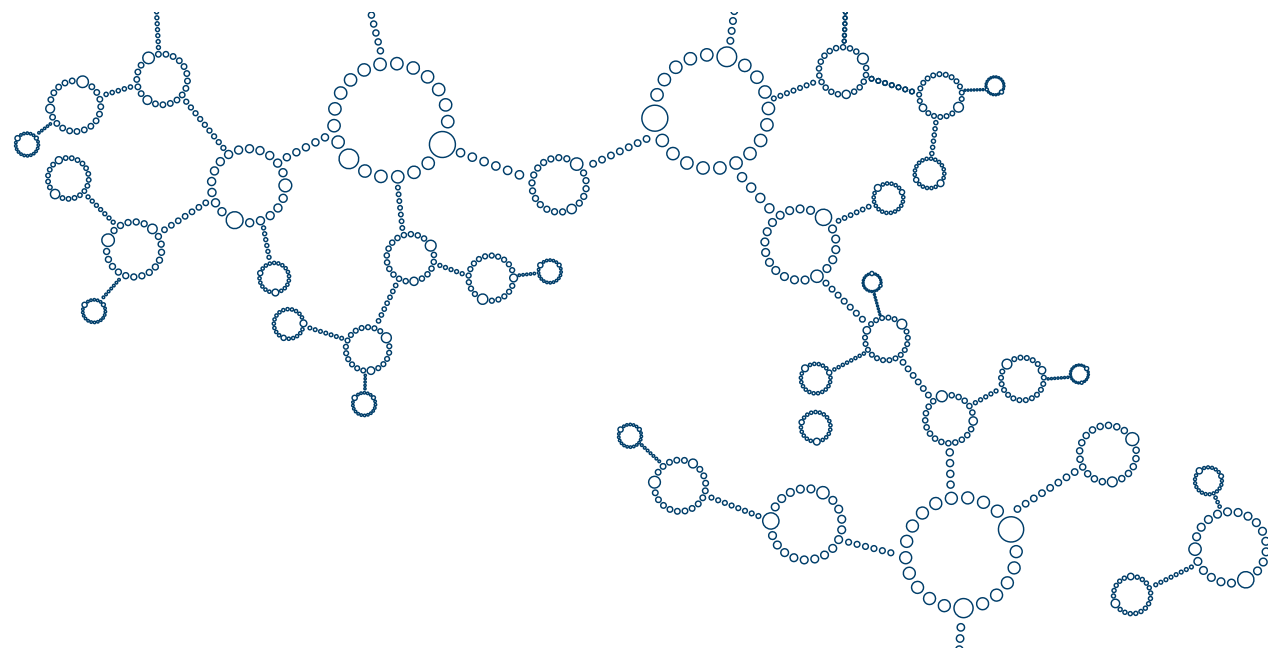
D. Amirault	D. Jardine	L. Smith
C. Caron	M. Kay	T. Smith
M. Cook	K. Martin	T. Webber
P. Doucette	C. Roberts	E. Young
M. Duke-Munden	C. Shay	

Neurosurgery OR Nurses

J. Barnes Smith	A. George	R. Mann
B. Brake	J. Hoyt	S. Oivanen
J. Derengoski	A. Jurcina	A. Woods
S. Dobbin	D. MacQueen	

Neurosurgery OR Attendants

J. Gallant	P. Parsons	T. Thomas
S. Gibson	J. Redmond	J. Tufts
D. Hall	T. Ruggles	R. Williams
L. MacIsaac	G. Sherwood	M. Wilson
N. Murphy	D. Splane	



**HALIFAX
NEUROSURGERY**

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ANNUAL REPORT

DIVISION OF NEUROSURGERY

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