

Neurology

Neurosurgery

Physical Medicine and Rehabilitation

Translational Neuroscience

Department of Clinical Neurosciences

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Department of Clinical Neurosciences

Annual Report 2013-2014

INNOVATION THROUGH COLLABORATION



Department Goals

- 1** To provide excellent clinical care in Neurology, Neurosurgery and Physiatry to patients in our referral area.
- 2** To develop clinical-academic programs in the Clinical Neurosciences of national and international stature. These programs will provide special assessment and treatment, develop and test new forms of treatment and explore disease mechanisms.
- 3** To provide excellent educational programs in the Clinical Neurosciences and related basic neurosciences including undergraduate courses, clerkship, residency training, postgraduate training and continuing medical education.
- 4** To promote and conduct clinical research and clinically relevant basic science research into diseases of the nervous system.



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Message from the Department Head

Dr. Rajiv Midha

**Many ideas grow better
when transplanted into another mind
than the one where they sprang up.**

THE DEPARTMENT OF CLINICAL NEUROSCIENCES (DCNS) has become a nationally recognized leader in patient care, medical education and research.

Our neurologists, neurosurgeons, physiatrists, scientists and residents are among the best in the world—and our programs are sought out by those who wish to be at the forefront of their professions.

But we are also the first to recognize that our biggest achievements and most important innovations often come from collaboration.

We collaborate with colleagues at the University of Calgary and Alberta Health Services; we collaborate with world-renowned organizations such as the Hotchkiss Brain Institute (see interview with HBI's **Dr. Samuel Weiss** on Page 4).

And we collaborate with patients in clinics, trials and studies—which also keeps us focused on why our work is so important. Those patients and their family members sometimes collaborate with us as donors—which is the greatest compliment we could ask for.

We are thankful to Alberta Health, which provides funding toward the Academic Alternate Relationship Plan (AARP), enabling innovative delivery of health care, coupled with academic medicine, for our three clinical divisions of neurology, neurosurgery and physiatry.

This past year also included a number of other notable partnerships that you'll read about in our annual report. Here are a few highlights:

Dr. Alim Mitha's new lab is bringing together medical researchers and engineers to learn how

Oliver Wendell Holmes Sr.

19th century physician

The Poet at the Breakfast Table 1882

traditional surgical devices can be made more bio-compatible for surgery patients through tissue engineering. Though Dr. Mitha's work is just beginning and he has many hurdles to overcome, its application for conditions like brain aneurysm is inspiring.

Dr. Steve Casha is leading a team of international investigators who are implanting stem cells in patients with spinal cord injuries. The trial is initially studying the safety of the procedure and how patients tolerate it, but they will ultimately follow the outcomes of 12 patients over a five-year period.

Neurology resident **Dr. Aravind Ganesh** has had an incredible year and shows no signs of slowing down. In August, Dr. Ganesh and his SnapDX team won first place at the 2014 World Innovation Day in Geneva. In December, he was awarded a Rhodes Scholarship and will be spending two years studying and networking at the University of Oxford.

Our residency programs – in Neurology, Neurosurgery and Physical Medicine and Rehabilitation – continue to attract and train an impressive group of doctors. In physical medicine, Program Director **Dr. Stephanie Plamondon** has welcomed **Drs. Rebecca Iwanicki** and **Jennifer Litzenberger**; in neurology, **Dr. Michael Yeung** has welcomed **Drs. Kelvin Au, Parichita Choudhury**



and **Sara Finkelstein**; and in neurosurgery, **Dr. John Hurlbert** has welcomed **Drs. Albert Isaacs** and **Michael Yang**.

We are also fortunate to have 11 new Fellows join us within our various programs.

DCNS made two important division appointments in the past year. **Dr. John Wong** has officially become division head for Neurosurgery and **Dr. Luanne Metz** is the new division head for Neurology.

I am very grateful for the many contributions of **Dr. Werner Becker** during this time as interim division head for Neurology.

The Division of Translational Neuroscience, in conjunction with the Hotchkiss Brain Institute, attracted an exceptional candidate for the Tourmaline Oil Chair in Parkinson's Disease.

Dr. Oury Monchi joined us in September from the Université de Montréal and I am very pleased to have him in our department to lead clinical research.

It was also an outstanding year for us in publishing with over 375 papers accepted from our department members, many in highly impactful journals. In the same period, approximately \$20 million in grant funding was secured by our faculty.

Thank you for taking the time to read our annual report. If you would like to learn more about the Department of Clinical Neurosciences, please visit us at www.ucalgary.ca/DCNS.

We look forward to collaborating with you.

Dr. Rajiv Midha

Head, Department of Clinical Neurosciences



Dr. Oury Monchi was recruited to DCNS in 2014.



What have been some of the defining moments since the founding of Hotchkiss Brain Institute?

SW: It's been an incredible 10 years since the Hotchkiss family provided the initial lead gift of \$10 million to establish the Hotchkiss Brain Institute at the University of Calgary.

We have achieved so much, it's really hard to pick out only a few highlights.

In 2007, V. Wee Yong, PhD, and Dr. Luanne Metz led a study into a common acne medication that has the potential to delay the progress of multiple sclerosis and continue to create new medicines for repairing damage and recovering function in people with progressive MS.

In 2010, Dr. Sean Dukelow helped develop a fully customizable robotic stroke assessment tool, the KINARM, which he uses to study the impact strokes have on people in the hope of speeding up their recovery times.

In 2011, the Government of Alberta and members of the Calgary Community came together as a tribute to the late Harley Hotchkiss and announced the Rebecca Hotchkiss International Scholar Exchange (RHISE) Program. This program has established a unique learning environment for all HBI members and trainees—through their interactions with visiting scholars, and the numerous opportunities to learn new techniques and methods from the best and brightest around the world.

In March 2012, The Mathison Centre for Mental Health Research & Education was made possible

HOTCHKISS BRAIN INSTITUTE

An interview with Dr. Samuel Weiss, director of the Hotchkiss Brain Institute

by a \$10 million investment from Mr. Ronald P. Mathison. With a focus on youth mental health, The Mathison Centre supports research into the early identification, prevention and treatment of mental illness.

How has the HBI evolved over the past 10 years?

SW: In 10 short years, the HBI has grown to become an internationally recognized centre in neurological and mental health research and education.

The first five years for the HBI were about organizing ourselves to be greater than the sum of our parts. We began to form the connections between brain and mental health, research and education, basic and clinical science.

The second five years were an effort to translate the best foundational science into our clinical programs such that knowledge could be tested more effectively in diagnostics and therapeutics.

What sets the HBI apart?

SW: First and foremost, it's our talent pool and the integration that we have between the basic and clinical community. But it's also about the manner in which we are organized, focused and strategic.

What role does collaboration play in your neurological and mental health research?

SW: The Department of Clinical Neurosciences is a big piece of the HBI's clinical research foundation. It's where we hope to be able to collaboratively create a neuroclinic research model that is going to allow for patients to be potential research subjects.

Through well defined and well organized registries, we will have enhanced our capacity to test our new ideas first and foremost in the clinics that are run by DCNS.

What are some of the organizational or research priorities for the next 10 years?

SW: One of our organizational priorities is summed up by an equation: Neuroteams plus Neurotechnology equals Neurodiscovery.

Essentially what this means is that dedicated teams, combined with cutting edge, innovative technologies such as brain imaging and brain stimulation, will result in discoveries that ultimately benefit the brain and mental health of our community.

Our motivation is to understand the human condition and improve it, particularly in the three priority areas: Brain & Behaviour; Neural Injury, Repair & Rehabilitation; and Healthy Brain Aging.

The Division of Neurology

Dr. Luanne Metz

THE DIVISION OF NEUROLOGY INCLUDES

56 neurologists, including four neurologists who did part-time locums. Our vision is to improve the quality of life and productivity in our society by reducing the burden of disability caused by neurological disorders. Our mission is to be an international leader in neurological patient care, education and research.

To meet its mission, the division is organized into subspecialty care programs, including headache, neuromuscular/ALS, multiple sclerosis/neuroimmunology, movement disorders, epilepsy, general neurology, neuro-ophthalmology/neurovestibular, stroke and cognitive neurosciences.

In addition, division members play important roles in Calgary's neuro-oncology and chronic pain programs and provide outreach services to the Calgary Urban Project Society and the Alex Medical Clinics.

Most of the neurologists are based at one of four hospital sites: Foothills Medical Centre (FMC); Peter Lougheed Centre (PLC); Rockyview General Hospital (RGH); and the South Health Campus (SHC). The Division operates as a cohesive unit with a city-wide on-call schedule organized by Dr. William Fletcher. All four hospital sites have inpatient neurology consultation services. Two sites, the Foothills Medical Centre and the South Health Campus, have neurology inpatient ward services.



Highlights and Notable Mentions

- Luanne Metz (division member since 1999) assumed the role of Division Head in January 2014. Monthly meetings of program and site leaders provide regular broad input and guidance.
- Werner Becker (division member since 1978) was awarded a Distinguished Service Award from the Alberta Medical Association in 2014. He was Head of the Division of Neurology from 1994 to 2004 then stepped up and assumed the reigns of leadership from March 2013 to December 2013. Werner continues to be a leader in education and clinical care and is recently noted for developing evidence based guidelines for headache management.
- In May 2014 the division was externally reviewed by Jon Stoessl from the University of British Columbia and Alan Purdy from Dalhousie University.

- Kevin Busche, who has been a member of the division since 2002, was appointed the Assistant Dean of Undergraduate Medical Education. He joins five division members who hold major leadership roles in the Cumming School of Medicine: Thomas Feasby is former Dean of the Faculty; Lara Cooke is Associate Dean, Continuing Medical Education; Sam Wiebe is Associate Dean of Clinical Research; Michael Hill is Associate Dean of Clinical Trials; and Greg Cairncross is Director of the Southern Alberta Cancer Research Institute.
- This year signaled the beginning of several planned retirements. Keith Hoyte retired in December 2013 after 34 years practicing general and stroke neurologist in Calgary. Robert Bell retired in August 2013 after 22 years practicing as a neurologist in MS/neuroimmunology and general neurology.
- Two division members also moved on to new roles. Douglas Zochodne left to become the neurology division head at the University of Alberta after 23 years in Calgary as a leader in research and care of neuromuscular disease. Cory Toth left for a position in Burnaby, BC after nine years in our division. He was a Gold Star Teacher in the neuroscience course almost every year.

Research

- Eric Smith became the inaugural holder of the Kathy Taylor Chair of Vascular Dementia.
- Bijoy Menon, Lawrence Korngut and Eric Smith were all awarded CIHR grants.
- Philip Barber received a grant from the Heart and Stroke Foundation of Canada.
- Luanne Metz was co-lead and Marcus Koch was a project leader on a successful AIHS team grant led by V. Wee Yong.
- Michael Hill and co-lead Andrew Demchuk were successful in obtaining an AIHS team grant.

Education

- Three members of the division successfully defended their masters theses: Lawrence Korngut; Shelagh Coutts; and Farnaz Amoozegar.
- Three division members were awarded Gold Star Teaching Awards: Cory Toth; Lara Cooke; and Nathalie Jetté.
- Second year neurology resident Aravind Ganesh was awarded a Rhodes Scholarship, which will allow him to study at the University of Oxford for three years starting in 2014. He also won first place at the 21st Century Innovation Academy for developing an app on clinical decision making.
- Fourth year resident Tyson Brust was awarded an American Academy of Neurology 2014 Education Research Grant.
- Fifth year resident Chris Hahn won the RCPSC KJR Wightman Award for Scholarship in Medical Ethics.
- Colin Josephson (Epilepsy Fellow) won the Susan S. Spencer Clinical Research Fellowship Award for 2014 from the American Academy of Neurology, American Brain Foundation, American Epilepsy Society and the Epilepsy Foundation.

Clinical Care

- The neurology inpatient unit at SHC celebrated its first anniversary.
- An outpatient nurse now supports the general neurology program in Area 3 at FMC. This has been very much appreciated by staff and patients.
- Unit 112 is now supported by a pharmacist.
- Planning began to build the neurology programs at PLC and RGH.
- Katayoun Alikhani assumed leadership of the MS program and Chris White became acting leader of the neuromuscular program and neurophysiology.

Measurement is key to continuous improvement, says Neurology head

EARLY IN HER CAREER,

incoming Neurology division head Dr. Luanne Metz made the decision to pursue a residency in neurology instead of psychiatry and the rest is history. Dr. Metz returned home to Calgary for her neurology training, then in 1988-89 completed a Multiple Sclerosis fellowship in the MS Clinic and Dr. Marvin Fritzler's immunology lab.

"In the early days of my practice I spent about 80 per cent of my time in the clinic. I focused on multiple sclerosis, headache and general neurology. I very much enjoyed that but my curiosity and impatience to get answers led me to pursue research," she says.

As a clinician she received her first grant to study multiple sclerosis in 1991.

"My interest in multiple sclerosis at that time was growing and clinical trials in multiple sclerosis were really just beginning to take off. We had a very well developed clinic so we became quite involved in clinical trials, but I also designed and implemented investigator-initiated trials. That has become the major direction of my research."

In 1993, Dr. Metz became the MS clinic director and moved from a major clinical to an academic position in the university.

We need to confirm which areas we are doing well in and to identify the areas we need to work on.

If we don't measure then we don't know where the trouble spots are.

— Dr. Luanne Metz

"I learned very early on that when there were frustrating but important questions and nobody seemed to be answering them, the best solution was just to start working on them."

Dr. Metz has studied the use of corticosteroids in multiple sclerosis and her work has since played a major role in the current common use of oral steroids instead of intravenous steroids for patients experiencing multiple sclerosis relapses.

"I am a big believer in clear

processes, so one of the things that has been developed through the multiple sclerosis clinic is processes to make things safer, more efficient, and transparent. This has played a big role in our clinic and it has helped to facilitate excellent patient care," she says.

Dr. Metz explains that over 95 per cent of people living with MS in southern Alberta see a neurologist at the MS clinic in Calgary.

"This speaks to our care and the fact that many people are choosing to come to our clinic," she says. She explains that she is happy with the fact that there is population-based care in Calgary where those that need the care, receive it.

One of her current priorities as division head is to develop metrics around what is happening in the division of Neurology.

"We need to understand wait times and the metrics around wait times and then build into that processes for feedback from the community," she says.

"One of my major goals as Division Head is to not only build upon the strengths of

our programs and to work to support the programs that are still developing, but also to take a broader look and to get direction from groups that are doing more in the area of measurement. We need to confirm which areas we are doing well in and to identify the areas we need to work on. If we don't measure then we don't know where the trouble spots are."

Dr. Metz says one of her other goals as division head is to develop future leaders. She says she believes leadership is about pulling her team together while having a future direction in mind.

"Having been in Calgary all this time, I have had the privilege of seeing leaders at all levels and that has helped me tremendously," she says.

Dr. Luanne Metz



10 years later, CHAMP still delivering help to headache patients



Dr. Werner Becker helped launch the Calgary Headache Assessment and Management Program.

FREQUENT STRUGGLES WITH HEADACHES

disrupt the lives of many patients—and they often need a variety of medications to help them improve their condition. In addition to medications, many also need education, advice and help with making important changes in their lives. They need to learn behavioural approaches for dealing with their headaches.

Thanks in part to Professor Dr. Werner Becker and his development of The Calgary Headache Assessment and Management Program (CHAMP), many of these patients have received the help they need to learn to manage their debilitating headaches more successfully.

When Dr. Becker arrived in Calgary in 1978 to start working as a neurologist, many patients were referred to him with severe headaches.

“These patients often weren’t doing very well, and if you saw the patient in follow up maybe six months later, often not that much had changed. Often patients with pain, including headache, are complicated to treat,” he says.

Dr. Becker soon realized there was a need to help patients to manage their headaches better. In 2003, based on a proposal he submitted, The Calgary Headache Assessment Management Program was born. Funding was provided by the Alberta Medical Services Delivery Innovation Fund. At the time, the fund was seeking innovative programs for delivering patient care.

“They accepted our letter of intent and then asked for a full proposal, which was eventually approved for funding. We had three years to start the program and prove its worth to the (then) Calgary Health Region,” he says.

Dr. Becker says the plan behind the program was to provide patients with headache more follow up and a multi-disciplinary care approach. Referrals to the program have been building ever since.

A variety of headaches types are treated, however the majority of those who come to the program

suffer from migraine. Many of those taking part in the program experience headache on more than 14 days a month, and some have headache every day.

The CHAMP headache Program, which is now part of the Calgary Pain Program, is currently located at the South Health Campus and has been directed by Dr. Jephtha Davenport since 2011. The program receives over 2,000 patient referrals per year and it takes a five pillar, multi-disciplinary approach to treating patients. The pillars are represented by: an education session; a lifestyle assessment; a self-management workshop; nursing advice; and physician assessments.

Patients must be referred to the program and some patients, based on the nature of their headache disorder, are sent through directly for a physician consultation. The majority of patients, however, enter the program through an education session where they are given information on headache diagnosis, treatment and management. Once registered, they are able to sign-up for workshops,

lectures, and a lifestyle assessment with an occupational therapist. Through the sessions, patients can also learn how to overcome problems related to overuse of painkillers and other acute headache medications, which are common among those suffering from severe migraines.

Dr. Becker is proud of the fact that, more than 10 years after its creation, the program is still very busy and its referral numbers are growing every year. “The core focus of the program is to give patients the skills they need to practice effective headache self management.”

“We have also had a number of headache Fellows come through the CHAMP program and this also speaks to its success,” he says.

A number of research projects have started as a result of the program and a set of headache guidelines have been created in association with headache experts from across Canada.

www.headachenetwork.ca



Program unites clinic and lab work to treat brain injuries in children

When most people think of brain injury, you think of IQ; you might think of motor deficits, but in actual fact the biggest problems for kids are things like concentration and mood and social outcomes.

— Dr. Karen Barlow

DESPITE HUGE ADVANCES

in the areas of mild traumatic brain injury and concussion, there are still fundamental challenges when a parent brings their child to the Emergency Department.

Some patients present with symptoms of a concussion—dizziness, headache, balance issues—but are actually suffering inner ear injuries.

Others have been complaining about persistent symptoms for months but traditional diagnostic tests are unable to detect the injury.

That's where Dr. Karen Barlow and Dr. Michael Esser have found their unique approach is making a difference at Alberta Children's Hospital.

Dr. Barlow says the combination of clinical practice and translational science is helping them tackle traumatic brain injury questions that would be difficult to address on their own.

"We're trying to mesh the two together," says Dr. Barlow. "That's what's unique about our program here."

A recently accepted paper in the *Journal of Neurotrauma* is a perfect example of how their program brings clinicians and scientists together across campus.

"It's the first paper looking at near-infrared spectroscopy (NIRS testing) in traumatic brain injury

in kids that we're aware of," she says. "That's kind of novel."

Dr. Barlow and Dr. Jeff Dunn, from the Hotchkiss Brain Institute, found that children—up to nine months after their injury—were complaining of symptoms that couldn't be detected using other modalities of looking at their brains.

"We don't have a diagnostic test for post-concussion syndrome," notes Dr. Barlow. "What we've found in this small pilot study is that cerebral metabolism using NIRS (or a marker of cerebral metabolism using NIRS) looks very, very different."

While continuing to explore this exciting outcome, Dr. Barlow is also in the first year of a four-year, controlled trial of melatonin in children with persistent symptoms after a concussion — the PlayGame trial. Their attendance at an international research conference in San Francisco demonstrated how important the trial is.

"Of the research that was presented," she says, "this is the only kind of pharmacological trial that's going on right now."

Much of their research is modeled in the lab by Dr. Esser to gather data that is hard to come by in patients.

"In the lab," says Dr. Esser, "we look at differences in outcomes from similar types of injuries and then start to examine things at



Dr. Karen Barlow and Dr. Michael Esser collaborate at Alberta Children's Hospital.

a molecular level—so what is happening within cells, between cells and both in the immediate and long term?”

And using animal models, Dr. Esser is able to recreate and study behaviours that clinicians see in their patients. He recently collaborated with neuropsychologist Dr. Keith Yeates to study social outcomes in kids after traumatic brain injury.

“Kids are not going to school and we try to figure out ‘why are you not going to school?’ “ says Dr. Esser.

“A lot of time it’s because, socially, there are consequences related to the injury,” he says. “It changes the way they respond

to verbal and non verbal cues both in terms of initiating and responding—because there’s lots of things that go on in a social interaction that you’re not really conscious of but it can make a difference of how you fit in.”

So Dr. Esser studied the issue with rats and saw an amazing result.

“(The rats) actually appear to change their hierarchy and they become stigmatized,” he says. “So what we found is directly related to what Dr. Yeates had found.”

The social impact of brain injury in children is one Drs. Barlow and Esser hears repeatedly from parents.

“When most people think of

brain injury, you think of IQ; you might think of motor deficits, but in actual fact the biggest problems for kids are things like concentration, mood and social outcomes,” says Dr. Barlow.

Early diagnosis and treatment are critical, she says, especially after injuries while skiing or snowboarding. If you’ve had a concussion, don’t ski to the bottom of the hill, she warns. Get help and be taken off the hill and assessed rather than risk a further injury going down the hill.

“If in doubt, sit it out,” says Dr. Barlow.

For more information about concussion and traumatic brain injury, visit www.4ctbi.ca.

Story of Neuroimmunology Clinic being written one blog at a time

AS IT WAS ONLY ESTABLISHED

in the fall of 2012, the Neuroimmunology Clinic at South Health Campus is relatively unknown to many. But that isn't reflected in the number of referrals they're getting.

"It's growing rapidly as people find out about it," say neurologist Dr. Katayoun Alikhani, "and in the absence of any form of advertisement."

And while most referrals to the clinic come from specialists—neurologists, rheumatologists and ophthalmologists and respirologists—they're also getting a surprising number of calls from out of province, including one from a doctor on Ottawa.

"I asked her 'how did you hear about us?' and she said she heard about us on patient blogs," says Dr. Alikhani.

"That was interesting for me to hear because that reflects the satisfaction on the part of patients."

That success is keeping the three neurologists (Dr. Alikhani, Dr. Paula de Robles and new member Dr. Hamid Ebadi) exceptionally busy and means out-of-province patients can only be assisted with consults, not ongoing care.

The clinic was founded with Dr. Robert Bell, who recently retired, and brought multidisciplinary care to patients with complex autoimmune or immune-mediated conditions that affect the nervous system.

"These are often patients who



These are often patients who require multiple specialists and it's very difficult for them to see all these specialists in a timely fashion.

— Dr. Katayoun Alikhani

require multiple specialists," says Dr. Alikhani, "and it's very difficult for them to see all these specialists in a timely fashion."

The Neuroimmunology Clinic provides a "home" for those that otherwise would have to jump around between specialists. "It is kind of like a one-stop shop," she says.

"Often these conditions are multi-system disorders and they have systemic involvement."

The clinic team includes rheumatologist Dr. Aurore

Fifi-Mah, neuropsychiatrist Dr. Aaron Mackie, respirologist Dr. Alex Chee and Dr. Chris White, who sees patients who present with predominantly peripheral nerve involvement or require EMGs.

The other important benefit, notes Dr. Alikhani, is that the clinic allows physicians to gain a better understanding of rare conditions.

"There's a lack of evidence in terms of how these types of patients should be treated and there's also very minimal information about what their outcomes are and what is the prognosis," she says.

"What are their needs? What is the impact of these conditions on people's function and employment?"

To address some of those questions, Dr. Alikhani says the clinic is beginning patient research and may even collect tissue samples for studies that would ultimately improve care.

"We are in process of establishing an outcomes study to do a longitudinal followup of these patients with various clinical and demographic components."

She is also focused on emerging entities—rare conditions that the clinic treats. "Some of these are really poorly understood and are just beginning to be established as separate clinical entities."

This will undoubtedly result in even more patient blog entries and long-distance referrals.

Researcher focused on imaging to improve stroke patient outcomes

ASSISTANT PROFESSOR OF NEUROLOGY

Dr. Bijoy Menon was very interested in vascular diseases (and stroke in particular) when he travelled to Switzerland for his fellowship in interventional neuroradiology. During this time, he developed a keen interest in how imaging was being used to treat patients with stroke.

“One of the leading stroke imaging programs in the world at the time was in Calgary, under the direction of Dr. Andrew Demchuk; so I wrote to Andrew and we discussed the possibility for me to do a fellowship there,” he says.

After two years, Dr. Menon completed his fellowship at DCNS, then moved into a clinical scholar position and finally transitioned to full-time membership with the department.

Dr. Menon recently received Canadian Institute of Health Research (CIHR) funding for a large multi-centre study of around 600 patients to examine the use of a new imaging technique with the hope to improve stroke outcomes. He was also recently awarded the Heart and Stroke Foundation/University of Calgary Professorship in Stroke Imaging.

“The importance of imaging is always there for stroke patients; we must always rely on a scan to determine whether or not the patient can be treated after experiencing a stroke,” he explains.

“When you have three different people experiencing a stroke it is very possible to have three very different outcomes based on differing blood flow in the brain,” says Dr. Menon.

“When a patient experiences a stroke, tiny blood

vessels called collaterals help to change the flow of blood after the artery is blocked. Each person can have different collaterals, and therefore he or she may experience very different outcomes after experiencing a stroke,” he says.

“Half of our patients do not tend to do very well after a major stroke and often the major determining factor of how patients recover after stroke is based on how many collaterals they have.”

Using an imaging technology called Multi-phase CTA, Dr. Menon’s team has been able to see the effect of reduced collaterals on blood flow in the brain at various times.

“We can look at the pial arteries that are filled by collaterals and predict which patients will do well after stroke and which patients will not,” he says.

Dr. Menon explains that there can be limitations with the use of current imaging tools. The CIHR grant he received will help him to compare the ability of new and more sophisticated tools like multi-phase CTA and perfusion CT with current tools like CT in ability to help physicians make clinical decisions.

He says his research will also help determine why different people have different collaterals at baseline.

Dr. Menon adds that his research success would not be possible without the support he has received from DCNS.

“It is very important for researchers who are just starting out to have support from colleagues and superiors who know them, care about them and who talk to them about their future goals.

“Drs. Demchuk, Hill, Goyal, Midha and Metz have done all three of those things for me,” says Menon.

“My colleagues in the Stroke Program and in the Departments of Neurosciences and Radiology have been extremely supportive.”



Dr. Bijoy Menon

The Calgary Comprehensive Epilepsy Program

Program Leads: Dr. Neelan Pillay, Dr. Sam Wiebe

Overview

As one of the premiere epilepsy centres in Canada, the Calgary Epilepsy Program works collaboratively to find the most appropriate treatment for each patient. We develop innovative ways to diagnose and treat epilepsy. The Calgary Epilepsy Program consists of a unique core of specialists. These include: epileptologists, epilepsy surgeons, EEG technologists, neuroradiologists, allied health professionals (nurses, neuropsychologists, clinical psychologists), basic scientists, physician clinical assistants and trainees (neurology residents, epilepsy Fellows and graduate students) who all work together with the common goal of improving care for those with epilepsy.

Patients and families often present with complex needs arising from the impact of this chronic illness. These needs along with the experience of change in their disease process and their response to treatment make it increasingly important to maximize the full potential of each individual with epilepsy through an integrated care approach. The Calgary Epilepsy Program continually strives to be a centre for clinical and academic excellence through the improvement of consolidated clinical services, education and research. Enhancing local, national and international initiatives to improve care for our patients, the program provides:

- Sophisticated, state-of-the-art neurophysiologic assessment including: EEG, evoked potentials, 24-hour ambulatory EEG monitoring, functional brain mapping and intraoperative monitoring
- Inpatient video EEG monitoring to evaluate potential epilepsy surgery patients at the Foothills Medical Centre and the South Health Campus
- ICU continuous video EEG monitoring for seizures in critically ill patients at all four adult sites in Calgary Zone
- Neuropsychological assessment and psychological counselling
- Epilepsy surgery for drug resistant epilepsy

- Vagal nerve stimulation (VNS)
- Access to the latest clinical research in epilepsy including drug trials, new surgical treatments and other innovative research using the latest technologies and methodology to improve health outcomes.

Highlights

- The theme for the 4th Annual Epilepsy Symposium held in October 2013 was super refractory status epilepticus (SRSE). This refers to status epilepticus that continues or recurs 24 hours or more after initiation of treatment with anesthetic antiepileptic drugs. It carries high morbidity and mortality and should be treated promptly and effectively. Despite advances in early diagnosis and treatment with antiepileptic medications, the optimal management of SRSE is often challenging and at times results in death or devastating neurological sequelae. Renowned international (Drs. D. Lowenstein, H.P. Goodkin) and national guest speakers (B. Young, C. Hahn, A. Kramer) addressed the state of art concepts on the pathophysiology, best management and new therapeutic targets in SRSE.
- Dr. Dan Lowenstein gave the Mary Anne Lee Lecture on Advances in the Genetics of Epilepsy
- Dr. Nathalie Jetté was elected President-Elect of the Canadian League Against Epilepsy and elected as a member of the North American Commission of the International League Against Epilepsy (ILAE). She was invited to sit on the World Health Organization (WHO) Mental Health Gap Action Programme Guidelines Committee where she is leading the development of guidelines for drug resistant epilepsy. She was also invited to write the epilepsy chapter for the WHO Disease Control Priorities in Developing Countries Manual. The purpose of this book is to provide information on evidence-based cost-effective interventions for mental health and neurological conditions, as a means to ultimately reduce morbidity and mortality.

- Dr. Paolo Federico continues to run his clinical fMRI and advanced structural MRI program based on experience from his research activities. He received a second, five-year CIHR operating grant, entitled “Superior seizure focus localization: implications for surgical outcome”. The aim of this study is to better identify the seizure focus, using advanced MR imaging methods to improve seizure freedom following epilepsy surgery.
- Dr. Sam Wiebe was elected by the international community as Treasurer of the International League Against Epilepsy, gave named lectures in Washington DC and Hyderabad, India, and chaired the American Academy of Neurology Dreyfuss Penry Award committee. He leads the faculty-wide Clinical Research Unit which now serves over 400 researchers and provides infrastructure and expertise for big data analytics. He serves on the University of Calgary Committee on Analytics and Visualization, which advises the President on the creation of a Campus Alberta-wide centre to support research through high- performance computing and visualization.

Education

Dr. Colin Josephson – Epilepsy Fellow and MSc Student in Epidemiology (supervisors: S. Wiebe and N. Jetté) was awarded the prestigious American Brain Foundation /American Epilepsy Society and Epilepsy Foundation Susan S. Spencer Clinical Research Training Fellowship, an Alberta Innovates Health Solutions (AIHS) Fellowship and a CIHR Fellowship (deferred by one year) for his research Clinical Decision Tool to Improve Epilepsy Care.

Research

Dr. Sam Wiebe holds the Hopewell Professorship of Clinical Neurosciences Research. He is involved in research to determine minimal clinically important changes in quality of life after epilepsy surgery, as well as development of tools to assess disease severity and disability, and satisfaction with

treatment in epilepsy. He is leading the use of large health care data to create clinical prediction tools in epilepsy and the systematic development of data platforms for the Calgary Epilepsy Program.

Dr. Nathalie Jetté holds a Canada Research Chair Tier 2 in Neurological Health Services Research and an AIHS Population Health Investigator Award. She is studying the epidemiology of epilepsy by improving and applying methods to detect, measure and monitor epilepsy, its comorbidities and health outcomes. She also addresses quality of care by developing, measuring and implementing knowledge exchange tools and strategies to improve epilepsy care.

Dr. Paolo Federico leads the only laboratory in the world performing intracranial EEG-fMRI at 3T, which is providing unique insights into the generation of interictal discharges. As an extension of groundbreaking animal work from Dr. Teskey’s laboratory at the Hotchkiss Brain Institute, Dr. Federico is also studying vascular & oxygenation changes following seizures. These changes might explain some of the neurological and cognitive deficits experienced by persons with epilepsy in between seizures.

Members

Physicians

Dr. Yahya Agha-Khani, Dr. Alexandra Hanson, Dr. Walter Hader, Dr. Paolo Federico, Dr. Nathalie Jetté, Dr. Brian Klassen, Dr. William Murphy, Dr. Neelan Pillay, Dr. Yves Starreveld, Dr. Samuel Wiebe

Psychology team

Dr. Sophia Macrodimitis (clinical psychologist), Dr. Lisa Partlo (neuropsychologist)

Neuroradiology: Dr. James Scott

Nuclear Medicine: Dr. Christine Molnar

Epilepsy Fellows

Dr. Colin Josephson, Dr. Dilip Singh, Dr. Sherry Sandy

The Calgary Stroke Program

Program Lead: Dr. Andrew Demchuk

Overview

The Calgary Stroke Program, a joint venture between the University of Calgary and Alberta Health Services, continues to grow and contribute to the field of stroke care. Our program figured prominently nationally and internationally on a number of fronts.

Highlights

- Our research team has taken a major step forward in academic medicine by leading a large potentially practice-changing multi-centre, multinational randomized clinical trial entitled ESCAPE. The trial has enrolled 310/500 subjects to date at 22 sites in five countries. It is the fastest enrolling endovascular trial in the world and is poised to complete recruitment early next year.
- The group continues to achieve a high level of academic productivity with 158 published citations in this academic year. This included one Lancet Neurology, one Circulation, and one Radiology article based on the IMS-3 trial. Several members were co-authors and the Calgary Stroke Program figured prominently in leadership and co-leadership roles for IMS-3.
- The clinical research component of the stroke program, led by Dr. Michael Hill, earned a five-year, \$5 million Alberta Innovates Health Solutions-CRIO grant in collaboration with the University of Alberta entitled "Quality Improvement Clinical Research (QulCR) Stroke Program".
- Dr. Shelagh Coutts completed the TEMPO-1 trial enrollment. This trial was a dose escalation study aiming to determine the most appropriate dose of Tenecteplase to use for a planned randomized clinical trial of IV thrombolysis in mild stroke patients with an intracranial occlusion.
- Dr. Bijoy Menon obtained a Heart and Stroke Foundation (HSF) University of Calgary Professorship in Stroke Imaging and a CIHR grant entitled "Precise and rapid assessment of collaterals using multi-phase CTA in the triage of patients with acute ischemic stroke for IA Therapy (PROVE-IT)". PROVE-IT will compare CT perfusion imaging with multiphase CTA.
- Dr. Sean Dukelow received a CIHR operating grant for "Rehabilitation, Stroke Deficits and Robotic Technology (RESTART)".
- Dr. Phil Barber was awarded a HSFA grant for "REPERFUSE: to study Reperfusion Injury post-thrombectomy."
- Dr. Philippe Couillard joined our group as new faculty. He is primarily appointed in Department of Critical Care Medicine as a neurointensivist after completing his training at the Mayo Clinic-Rochester.
- In 2014, our clinical care program was once again given the Award of Distinction from Accreditation Canada for May 2014 to 2016. This is the third consecutive Award of Distinction for our program and we remain the only centre in Canada to receive this award three terms in a row.

Education

As of June this year, our program has trained and graduated 55 stroke Fellows, from 17 countries including Canada. Last year we trained eight Fellows including four Canadians. In addition, we have seen a major increase in applications to our fellowship with two to three applicants per month.

Research

Research is the core of the CSP. Significant progress has been made over the last year to further establish the CSP as an internationally respected clinical research program and imaging core lab facility for large stroke trials. We function as the CT core lab for many multi-centre randomized trials.

Members

Stroke Neurology: Drs. Phil Barber, Shelagh Coutts, Andrew Demchuk, Michael Hill, Keith Hoyte, Adam Kirton (Pediatrics), Gary Klein; Bijoy Menon, Alekys Mineyko (Pediatrics), Dawn Pearson, Eric Smith, Peter Stys, Suresh Subramaniam, Tim Watson, Philippe Couillard

Stroke Physical Medicine and Rehabilitation:
Drs. Sean Dukelow, Ken Lam, Steve McNeil

Vascular Neurosurgery: Drs. Alim Mitha, Garnette Sutherland, John Wong

Interventional Neuroradiology:
Drs. Muneer Eesa, Mayank Goyal

Nursing: Dr. Teri Green

The Headache Program

Program Lead: Dr. Jephtha Davenport

Overview

The Headache Program is a collaboration between DCNS and the Calgary Pain Program. The program has two clinics within Calgary: the Calgary Headache Assessment & Management Program (located at the new South Health Campus) and the Headache Group of the Chronic Pain Centre (located at the Richmond Road Diagnostic & Treatment Centre). Satellite clinics include a headache clinic for patients with post-traumatic headache, within the Division of Physiatry's Traumatic Brain Injury Clinic, as well as general neurology clinics held in community health centres. Patients may participate in a variety of clinical, educational and research opportunities.



Dr. Jephtha Davenport

Highlights

The Headache Program follows a patient-centred, team approach with interdisciplinary collaboration. In total, the program receives over 2,000 patient referrals per year and we provide access to a greater number of patients each year. The program offers: group education sessions, telephone consultations with referring physicians and patients, and telehealth visits for patients living outside of Calgary. Many patients from Calgary and the surrounding communities work with the Headache Program as they search for strategies to improve their headache management.

Education

We provide training to: headache Fellows from Canada and abroad, residents in anesthesiology and family practice and medical students across Canada. The Headache Program also emphasizes the role of patient and family education in coping with headache disorders, many of which are chronic diseases with episodic manifestations.

Research

The Headache Program is invested in clinical research which includes a Phase 2 medication trial, an exercise trial, a bridging preventive medication trial, and a new electronic diary app. Other research includes outcomes measurement, quality improvement, and the development of provincial and national headache guidelines.

DCNS Members

Dr. Farnaz Amoozegar
Dr. Werner Becker
Dr. Lara Cooke
Dr. Jephtha Davenport
Dr. Arnolda Eloff

Physicians

Neuropsychiatrist: Dr. Aaron Mackie
Family physician: Dr. Lori Montgomery
Psychiatrist support services: Dr. Sam Oluwadairo,
Dr. Stephen Amadala, Dr. Pamella Manning

Nurses

Irene O'Callaghan, Rachelle Ellis, Nora Lee,
Deborah Thorne, Lillian Lowry, Beverly Harrison

Allied Health

Occupational therapists: Kathryn Coutts,
Allison McLean, Angie Yang
Physiotherapists: Kate Gerry, Philis Heffner
Psychologists: Dr. Penny Ford, Dr. Sharon
Habermann, Dr. Joel Roos
Pharmacist: Joyce Côté
Kinesiologist: François Gagnon
Dietician: Kelly Sullivan

Administration & Administrative Support

Leatha Semrick, Lydia Gallo, Lisa Bannister,
Kate Walker, Deb Nicholson, Krista Hansen,
Kristen Haakenstad, Connie Burkart,
Suzanne Basiuk, Carolyn Baldwin

The Cognitive Neurosciences Program

Program Lead: Dr. Eric Smith

Overview

The Cognitive Neurosciences Program provides expert medical consultation for cognitive disorders, educates undergraduate and postgraduate learners about the medical evaluation and treatment of cognitive disorders and dementia, and conducts research on the causes and treatment of cognitive disorders.

Program members include neurologists, psychiatrists, neuropsychology, research staff, and allied health professionals at the Foothills Medical Centre and South Health Campus (SHC) sites. There are five neurologists (Eric Smith, David Patry, Dawn Pearson, Bijoy Menon and Philip Barber) and four psychiatrists (Jeremy Quickfall, Zahinoor Ismail, Aaron Mackie and Robert Granger) who see patients in the clinic.

Highlights

The Cognitive Neurosciences Clinic added a new physician, Dr. Robert Granger from the Department of Psychiatry. Dr. Granger will see patients at the South Health Campus. Dr. Zahinoor Ismail was appointed as Assistant Professor of Psychiatry and Neurology at the University of Calgary.

Education

Residents in various disciplines, including neurology, psychiatry and geriatric medicine, have completed rotations in the clinic. A Clinical and Research

Fellowship Program for MDs is in development, and we will begin accepting Fellows in 2015.

Research

In September 2014 the Canadian government announced Canada's national research strategy for dementia, called the Canadian Consortium on Neurodegeneration and Aging. Our role within this consortium is to lead the team that will study vascular cognitive impairment. We will recruit patients with vascular mild cognitive impairment to identify which patients will experience cognitive decline or progress to dementia, and will plan and carry out a clinical trial to prevent vascular dementia. Additional clinical research studies are enrolling patients with mild cognitive impairment, Alzheimer's disease, and cerebral amyloid angiopathy.

Members

Neurology

Dr. Eric Smith, Dr. David Patry, Dr. Dawn Pearson, Dr. Bijoy Menon, Dr. Philip Barber

Psychiatry

Dr. Jeremy Quickfall, Dr. Zahinoor Ismail, Dr. Aaron Mackie, Dr. Robert Granger

Neuropsychology

Dr. Catherine Burton, Dr. Vinay Bharadia, Dr. Kim Goddard

The Multiple Sclerosis (MS) Program

Program Lead: Dr. Katayoun Alikhani

Overview

The Multiple Sclerosis (MS) Program provides multidisciplinary, population-based care to people with MS and other Central Nervous System (CNS) demyelinating disorders living in southern Alberta and southeastern British Columbia.

The services provided by our specialized clinical team, based on a chronic disease management approach include: medical, nursing, rehabilitation and counseling. Our goal is to prevent or lessen disability and optimize wellness. Our team also

provides leadership in care delivery and regularly provides advice regarding policies related to MS care.

Education

The MS program supports the education of trainees at all levels. An increasing number of residents are choosing to do MS Clinic rotations. Dr. Wee Yong leads the Alberta EndMS research and training network which enhances the experience and training of several graduate students and postdoctoral Fellows. (www.endmsnetwork.ca)

The General Neurology Program

Program Lead: Dr. Kevin Busche

Overview

The General Neurology Program involves many of the members of the Division of Neurology. These members provide outpatient clinical services to patients at each of the four adult hospital sites.



Dr. Kevin Busche

Highlights

Over the past several years, we have worked to develop a Central Access and Triage (CAT) system for general neurology. This system is now taking referrals and booking patients for all of the hospital-based general neurologists in the division. This has allowed us to have a much better understanding of the work being done in general neurology. It has also helped us to provide better patient care by recognizing more urgent referrals on a consistent basis and also recognizing patients that would be better served by an appointment in one of the subspecialty clinics.

The development of the CAT system spurred the development of a General Neurology Program. Prior to this, there were many neurologists seeing general neurology patients individually. Throughout the last year, we have moved towards bringing together the individual general

neurologists under the umbrella of the program. In August 2013 we had our first meeting of the general neurology program and we are working to build common processes for booking patients and providing better clinical care.

With the development of the program, we have been better able to measure, on a system-wide basis the need for general neurology services. Currently, there is a long waiting list for the general neurology clinics and work is already underway to find innovative ways to provide services for this patient group.

Education

Residents, clerks and medical students commonly spend time in the general neurology clinics.

Members

Dr. Brian Klassen, Dr. Michael Yeung, Dr. Jodie Burton, Dr. Alex Hanson, Dr. Michael Hill, Dr. Paula de Robles, Dr. Phil Barber, Dr. Lara Cooke, Dr. Marcus Koch, Dr. Keith Brownell, Dr. Kevin Busche, Dr. Jephtha Davenport, Dr. Sam Chhibber, Dr. Katie Wiltshire, Dr. David Patry, Dr. Farnaz Amoozegar, Dr. Dawn Pearson, Dr. Gary Klein, Dr. Suresh Subramaniam, Dr. William Murphy, Dr. Scott Wilson, Dr. Jagdeep Kohli

Research

The MS program is well recognized for its research strengths. In association with the Hotchkiss Brain Institute, current active research includes: translational research, clinical and epidemiological research, basic science, innovations in imaging and trial design and clinical trials.

Members

Physicians:

Drs. Katayoun Alikhani, Nadeem Bhanji,

Jodie Burton, Kevin Busche, Marcus Koch, Dan McGowan, Aaron Mackie, Jean Mah, Luanne Metz, William Murphy, Scott Patten, David Patry, Dawn Pearson, Michael Yeung.

Basic Scientists:

Lenora Brown, Shalina Ousman, V Wee Yong, Yunyan Zhang

Program leaders and managers:

Colleen Harris, Erin Gervais, Winona Wall, Graziela Cerchiaro, Charlotte Breakey, Claudia Silva

The Movement Disorder Program

Program Lead: Dr. Ranjit Ranawaya

Overview

Movement Disorders are diseases that result in slowness of movement such as in Parkinson's disease or involuntary movements such as tremor, dystonia, chorea, bradykinesia, and tics.



Dr. Ranjit Ranawaya

These disorders cause significant disability in one out of every 100 Albertans and impact over 30,000 Alberta families. The program provides a multidisciplinary clinic with a staff of over 20 individuals including specialists in neurology, neurosurgery, psychiatry, nursing, social work, psychology and physiotherapy. The program treats over 2,000 patients with Parkinson's disease, Huntington's

disease, Tourette syndrome, spinocerebellar ataxia, dystonia and tremors.

There is a large research component in the program that focuses on improvements in treatment of Parkinson's disease and related disorders. Research to understand basic mechanisms of disease is coordinated through the Hotchkiss Brain Institute. This program is designated as a Centre of Excellence for Parkinson's disease by The National Parkinson Foundation in the USA.

Highlights

- Dr. Justyna Sarna has been hired to fill a permanent position.
- Dr. Oury Monchi, PhD has been appointed to the Tourmaline Chair in Parkinson's disease and will act as the Research Director of the Movement Disorders Program. He is also a member of the Neurosciences Group in the Hotchkiss Brain Institute.

Research

- Neuroprotection for Parkinson's disease (PD)
- Music therapy in PD
- Identification of genetic factors in PD
- Neuroprotection for Huntington's disease (HD) as well as two long term followup prospective observational trials for HD
- Novel treatments in PD, HD, dystonia, and spinocerebellar ataxia
- We continue to do clinical trials in Parkinson's disease, dystonia, Huntington's disease and Tourette syndrome.

Members

Dr. Ranjit Ranawaya
Dr. Sarah Furtado
Dr. Scott Kraft
Dr. Tamara Pringsheim
Dr. Justyna Sarna
Dr. Oury Monchi PhD
Dr. Zelma Kiss
Dr. Bin Hu
Dr. Angela Haffenden
Dr. Jeremy Quickfall
Dr. Aaron Mackie

Nurses - Clinical
Karen Hunka
Pia Lawrence
Nancy Labelle
Tracy Hammer

Nurses - Research
Lorelei Tanish
Carol Pantella
Nancy Labelle
Tracy Hammer

Secretarial Support
Sue Dalzell
Marlene Conrad
Bonita Woytowich

The Neuro-ophthalmology and Neurovestibular Programs

Program Lead (Neuro-ophthalmology): Dr. William Fletcher

Program Lead (Neurovestibular): Dr. Suresh Subramaniam

Overview

The Neuro-ophthalmology Program is centred at the Rockyview General Hospital Eye Clinic and focuses on disorders of vision and eye movement caused by neurological diseases, including multiple sclerosis, brain tumour and stroke. The Neurovestibular Program is centred at South Health Campus and focuses on vertigo and dizziness. Both programs provide state-of-the-art diagnosis and treatment, including laboratory testing and physical and occupational therapy.

Highlights

Over 700 new patients were assessed by each program in the current year. Most patients assessed in the Neuro-ophthalmology Clinic were referred by other specialists. A visual rehabilitation program was started for patients with loss of visual field caused mainly by stroke. The Neurovestibular Program hosted a weekly Urgent Vertigo Clinic, tested 375 patients in the vestibular laboratory and provided vestibular physiotherapy to over 800 patients.

Education

The Neuro-ophthalmology Program trains Neurology and Ophthalmology residents throughout the year. The Neurovestibular Program trains Neurology and Otolaryngology residents.



Dr. William Fletcher



Dr. Suresh Subramaniam

Faculty and staff in both programs provide resident rounds, seminars and examinations and teach medical students and allied health staff. Graduates of the Neuro-ophthalmology Fellowship Program include Drs. Elena Sokolova and Suresh Subramaniam.

Research

Funded research projects in Neuro-ophthalmology include a NIH-sponsored study of idiopathic intracranial hypertension, studies of the roles of hormones, vitamin D and a novel drug in optic neuritis and the use of optical coherence tomography in multiple sclerosis and Parkinson's disease. Projects in the Neurovestibular Program include the study of a prototype rotary chair in the diagnosis of vestibular dysfunction and a study of physiotherapy in vestibular migraine.

Members

Medical Staff

Dr. William Fletcher
Dr. Fiona Costello
Dr. Suresh Subramaniam
Dr. Beth Lange

Vestibular Physiotherapy

Kimberly Weber
Veronique St. Georges
Dominique Le Blanc

Vestibular Laboratory Support

Craig Mulroney

Clerical Support

Gina Quinn

The Neuromuscular Program and ALS Clinic

Acting Program Lead: Dr. Chris White

Overview

Established in 1992, The Neuromuscular Program meets the overall health needs of people with peripheral nerve, muscle and neuromuscular junction disorders. Additionally, this program provides state of the art diagnostic and treatment services as well as cutting-edge research. The overall emphasis of this program is on excellence in patient care, collegiality, education and innovation.

To date, the program consists of several sub-specialty clinics: the Neuromuscular Clinic, the ALS and Motor Neuron Disease Clinic, Peripheral Nerve Clinic, the Neuromuscular Rehabilitation Clinic and Neuromuscular Electrophysiology. The program is sited at the South Health Campus (SHC) and Foothills Medical Centre (FMC). The vision of this program is:

To be Canada's leading Neuromuscular Program by being the centre for integrated patient care, research and education.

Highlights

Dr. Chris White has assumed the role of Acting Director for the Neuromuscular Program and the electromyography labs. He continues as the Site Director of the Department of Clinical Neurosciences at the SHC. He is an examiner for the Canadian Society of Clinical Neurophysiology EMG section and as a Royal College of Physicians and Surgeons Examiner in Neurology.

Dr. Keith Brownell was elected for a three-year term to the Council of the College of Physicians and Surgeons of Alberta. He received a neurology AARP Award in category of Colleague of the Year and a 2013 AB Baker teacher recognition certificate from the American Academy of Neurology. He serves as an active member of Foothills Medical Centre Ethics Committee and has agreed to be part of the development of ethics protocols at the SHC.



Dr. Chris White



Dr. Lawrence Korngut is the National Principal Investigator of the Canadian Neuromuscular Disease Registry (CNDR), a national network of centres that register their patients to enable clinical research and the development of new treatments. He is the Chair of the Canadian Neuromuscular Disease Network (CAN-NMD) that was launched in 2014. He is the Chair of the Medical and Scientific Advisory Committee for Muscular Dystrophy Canada and he is the director of the Calgary ALS and Motor Neuron Disease Clinic.

Dr. Sameer Chhibber introduced an integrated muscle biopsy clinic at SHC designed to provide timely muscle biopsies working closely with neuropathology to improve and advance neuropathological diagnosis. He led the neuromuscular educational program that in the last academic year, trained two neuromuscular Fellows and 21 residents. Dr. Chhibber was also awarded the 2013 Teacher of the Year award from the Department of Physiatry.

Dr. Tom Feasby rejoined the Neuromuscular Clinic in 2013 after the completion of his deanship at the Cumming School of Medicine. He has ongoing interests in the overuse of healthcare interventions and inflammatory neuropathy. He received an honorary DSc degree from Western University and the Medal for Distinguished Service from the Alberta Medical Association.

Dr. Hamid Ebadi has just joined the group having completed a neuromuscular disease fellowship at the University of Toronto. His focus is on clinical care and education, and he has a research interest in neuromuscular ultrasound.

Dr. Douglas Zochodne has moved on to be the Head of the Division of Neurology at the University of Alberta. Dr. Cory Toth has moved to a private practice opportunity in British Columbia. Recruitment to replace their research contributions is ongoing.

Education

This year we have embraced the use of telehealth and introduced a number of neuromuscular rounds including: weekly case rounds; muscle and nerve

pathology rounds; EMG waveform rounds; and monthly neuromuscular grand rounds, which are broadcast across sites and to our colleagues in Edmonton. Members of the neuromuscular group are actively involved in undergraduate medical teaching, instruction of DCNS residents and other trainees, on call or in clinic trainee teaching and postdoctoral, graduate, undergraduate and summer student supervision.

Research

Research activities include development and expansion of the Canadian Neuromuscular Disease Registry by Dr. Lawrence Korngut. The ALS/motor neuron disease clinic has been active in the trial of two compounds that are hoped to treat the disease. The group has also participated in international studies examining the outcome of Gullain-Barré Syndrome.

Members

Dr. Chris White, Dr. Lawrence Korngut, Dr. Keith Brownell, Dr. Sameer Chhibber, Dr. Tom Feasby, Dr. Stephanie Plamondon and Dr. Hamid Ebadi

Clinic Coordinators

Dana Tigner, Shannon Searle, Susan Munro, Roula Simmons, Kris Jagt

Clinical Fellows

Dr. Nicholas Earle - Chile, Dr. Amanda Fiander - Canada

Allied Health

Jacqueline Townshend PT, Monic Brunet OT, Crystal Collinge SLP, Ashley Dalton PT, Dr. Kim Goddard Neuropsychology, Sandy Jensen DH, Shannon Josey RD, Gina Kroetsch OT, Leon Mitchell SW, Ray Tye RT, Crystal Collinge SLP

Clinical Research Co-ordinators

Janet Petrillo, Jose Martinez

The Tourette Syndrome and Pediatric Movement Disorders Program

Program Lead: Dr. Tamara Pringsheim

Overview

The Tourette Syndrome and Pediatric Movement Disorders Clinic provides consultation and continuing care for children and adults with Tourette Syndrome and children with movement disorders such as dystonia, tremor, cerebral palsy, and complex motor stereotypies.



Dr. Tamara Pringsheim

Research

Research at the clinic is focused on (1) improving antipsychotic safety monitoring in children, (2) promoting rational and judicious use of these medications in children with disruptive behaviour disorders, (3) knowledge synthesis and translation.

We are conducting a prospective longitudinal study of children prescribed antipsychotic medications for neurodevelopmental disorders in which various safety measures, including extrapyramidal symptoms, metabolic, and hormonal side effects are actively monitored using the Canadian Alliance for Monitoring Effectiveness and Safety of Antipsychotic Medications in Children (CAMESA) guidelines.

We are recruiting children for a randomized controlled trial on the effect of a targeted knowledge intervention on anxiety, knowledge and attitudes about tics and Tourette Syndrome with a research team from across Canada.

Dr. Pringsheim has recently completed guidelines on pharmacotherapy of aggression, oppositional behaviour and conduct problems in youth with Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder and Conduct Disorder. These guidelines will form part of the foundation of an educational curriculum for residents. Dr. Pringsheim has also been working with the American College of Chest Physicians on their guidelines on the definitions and management of psychogenic, habit and tic cough.

Education

We provide training to residents in pediatrics, neurology and psychiatry, as well as Fellows in movement disorders and medical students. Residents in pediatrics spend time in the clinic as a part of their core developmental pediatrics rotation. Residents from other disciplines also take part in the clinic on an elective basis.

Members

Neurologists

Dr. Justyna Sarna
Dr. Tamara Pringsheim

Nursing

Tracy Hammer

The Urgent Neurology Clinic

Program Lead: Dr. Alexandra Hanson

Overview

The Urgent Neurology Clinic is an outpatient clinic for patients requiring an urgent neurology consultation. Its mandate is to see patients within one week, and strives to see patients within 72 hours. Further investigations are then expedited so they can be completed in a timely manner. The Urgent Neurology Clinic is a single program that holds clinics at both the Foothills Medical Centre and South Health Campus.



Dr. Alexandra Hanson

Highlights

In 2013, the Urgent Neurology Clinic received a total of 3,232 referrals (approximately half of which were appropriate for the clinic). Between the two sites, a total of 1,627 new patients were seen; 83.5% of which were seen within one week of their referral.

The Urgent Neurology Clinic continues to work closely with Neurology Central Access and Triage to ensure all patients are seen in the appropriate neurology clinic. Ultimately, the goal is for a seamless continuum between the Urgent Neurology Clinic and the General Neurology Clinics.

Members

Physicians

FMC:

Dr. Farnaz Amoozegar, Dr. Philip Barber, Dr. Jodie Burton, Dr. Paula de Robles, Dr. Tom Feasby, Dr. Sarah Furtado, Dr. Alexandra Hanson, Dr. Jagdeep Kohli, Dr. Justyna Sarna, Dr. Tim Watson, Dr. Michael Yeung

SHC:

Dr. W. Murphy, Dr. D. Patry, Dr. D. Pearson, Dr. G. Pfeffer, Dr. S. Subramaniam, Dr. K. Wiltshire, Dr. C. White

Nurses

FMC:

J. McNamara, C. Brigden, A. Jivraj, J. Ford, K. Lau

SHC:

L. Sorge

Clerks

D. Gyonyor, C. Sanchez, C. Polehoyki

Pediatric Neurosciences

Dr. Jong Rho

THE SECTION OF PEDIATRIC

Neurology based at the Alberta Children's Hospital (ACH) provides neurological care to the children of southern Alberta and neighbouring Saskatchewan/British Columbia.

Dr. Jong M. Rho leads over a dozen faculty child neurologists

and an extensive team of trainees and allied health professionals. Excellence in clinical care and research spans all elements of child neurology including epilepsy, neurotrauma and stroke, neurocritical care, headache, demyelinating and other neuro-immune conditions, neonatal neurology and brain malformations, neuromuscular and movement disorders, as well as developmental and cognitive, neurogenetic and metabolic disorders.

Clinical Care

Round-the-clock urgent care is provided through inpatient on-call service and outpatient urgent neurology clinics. Integrated collaborations across multiple pediatric specialities provide comprehensive, cross-disciplinary diagnosis and treatment. ACH Pediatric Neurology has provided over 700 inpatient consults and approximately 4,000 outpatient clinic encounters annually.

Education

Our RCPSC Residency Training Program remains fully accredited, has grown to nine residents (among the largest in Canada) and continues to maintain a 100% success rate on the Royal College exam. All section members are actively engaged in teaching through undergraduate, medical school, residency, graduate student, and post-doctoral fellowship levels. A rich





From left to right: Jeffrey Buchhalter, Karen Barlow, Michael Esser, Alice Ho, Luis Bello-Espinosa, Jong Rho (Head), Aleksandra Mineyko, Jean Mah, Morris Scantlebury, Laura Flores-Sarnat, Adam Kirton, Harvey Sarnat. (Not pictured: Robert Haslam, Kim Smyth, Tamara Pringsheim, Heather Graham, Alison Moore)

educational environment now includes more than 10 academic rounds and conferences per week, the most prominent of which is the Developmental Neurosciences Grand Rounds.

Research

Supported by the Alberta Children's Hospital Research Institute (ACHRI) for Child and Maternal Health, the Department of Pediatrics, the Alberta Children's Hospital Foundation,

and the Hotchkiss Brain Institute (HBI), our section continues to experience significant academic growth. Major operating and program grants are held from agencies including CIHR, NIH/ NINDS, AIHS, Brain Canada, HSFC, NeuroDevNet, CPIRF and ACHRI.

2013-2014 Highlights include:

- \$2,653,387 in active extramural funding for direct costs (brain metabolism,

neuromuscular, neurotrauma and stroke research programs)

- 65 peer-reviewed original papers, four book chapters, and 54 scientific abstracts presented
- 41 invited presentations at major national/international meetings
- Continued leadership roles in both national and international professional societies

The Division of Neurosurgery

Dr. John Wong

THE DIVISION OF NEUROSURGERY AT THE

University of Calgary and Alberta Health Services is fully integrated with its partner sections of Neurology, Physical Medicine and Rehabilitation (PM&R) and Translational Neurosciences within the Department of Clinical Neurosciences.

Within the confines of this highly integrated and programmatic approach, sub-specialized care is provided to our patient population. This population includes the geographic region of southern Alberta as well as eastern British Columbia in the Kootenay Region and western Saskatchewan, encompassing an approximate catchment population of 2.5 million. Care is provided by 14 neurosurgeons, all of whom are sub-specialists who also provide general and emergency neurosurgical services.

Specialized programs include cerebrovascular and endovascular neurosurgery, epilepsy neurosurgery, hydrocephalus care, neuro-oncology, skull base surgery, pediatric neurosurgery, peripheral nerve surgery, functional neurosurgery, stereotactic radiosurgery and multidisciplinary spine care and surgery. In partnership with neurology, PM&R, orthopedic surgery, neuroradiology, and radiation oncology, our members provide the highest quality of sub-specialized care for this patient population.

The total operative volume delivered by neurosurgeons was 2,500 cases in 2013-14, with 1,824 operative cases at Foothills Medical Centre and 193 at Alberta Children's Hospital. There were another approximately 100 cases of bedside and Intensive Care Unit procedures, about 250 cases of endovascular procedures in the neuro-interventional suite, and roughly 100 radiosurgery cases.



Highlights

- Our academic highlight remains the Charles Taylor Memorial Lectureship that pays homage to Calgary's first neurosurgeon. In 2014, Dr. Dennis Spencer, Chair of the Department of Neurosurgery at Yale University, was the 10th Annual Charles Taylor lecturer. Numerous respected professors and neurosurgeons visited our centre this past year.
- For the seventh year running, the highly regarded Spine and Peripheral Nerve Anatomy and Surgery Course exposed neurosurgery and orthopedic residents from across the country to the nuances of spine and nerve surgery in a unique hands-on supportive environment using didactic and cadaveric methods.
- Dr. Garnette Sutherland was honored in 2013 for his contributions to the field of neurosurgery and recognized by the Canadian Institutes

of Health Research (CIHR) and the Canadian Medical Association Journal (CMAJ) as among the latest recipients of the CIHR-CMAJ Top Canadian Achievements in Health Research Awards, which celebrate Canadian health research excellence. The same year, NASA recognized his neuroArm Project with the NASA-ISS Top Utilization of ISS for Medical Advancements-Terrestrial Applications Award for successfully translating space technology into a state-of-the-art health care technology on earth. In May 2014, Dr. Sutherland together with his invention neuroArm, was inducted into the Space Technology Hall of Fame.

Education

The neurosurgery residency training program continues to be the pride of the Division. Two new residents are accepted each year, with a current allotment of 16 trainees. The program is known for providing training in a collaborative and collegial environment where the highest quality of service and education are delivered. In addition to hands-on and didactic teaching of residents, the faculty contributes significantly to undergraduate medical education teaching in the small group curriculum as well as clerkship rotations. Ten Fellows joined our Division in various subspecialties, which is another positive indicator of Calgary's growing reputation for excellent training and care.

Research

Members continue to be involved in intensive research with several of them having peer reviewed and funded basic science and or clinical research programs. Many of these members partner with the Hotchkiss Brain Institute, and several faculty



Former Astronaut and Space Foundation Special Advisor Dr. Leroy Chiao, left, welcomes Dr. Garnette Sutherland into the Space Technology Hall of Fame in May 2014.

members have been granted full or affiliated membership. Areas of research strength and accomplishment include clinical trials in spinal cord injury research, basic bench research in nerve regeneration, laboratory work using brain tumour initiating stem cells, and intravascular stent development. We also proudly house one of the world's foremost laboratories in surgical robotics.

Pituitary program restores colours for young-at-heart Alberta artist



94-YEAR-OLD LORRAINE

Bysterveld is a lot of things.

She's a gardener, an accomplished painter, and she helps with chores on her daughter's farm.

"If I just sat around, I'd be a dud!" she laughs.

But when Bysterveld fell backwards off her son's front steps and hit her head, her family had no idea that the trip to Rockyview General Hospital might turn out to be a blessing.

"We were actually on our way, taking her to ... an artists' workshop down in the States," recalls Bysterveld's daughter Kathleen. "It was going to be a family holiday. We'd bought her that for her birthday."

Instead, the then-91-year-old underwent a CAT scan as part of a concussion workup and what showed up was a bit of surprise. A pituitary tumour was pressing



A painting by Lorraine Bysterveld.

on Bysterveld's optic nerve and she was told that, if the tumour wasn't removed, she'd be blind in six months.

For a lifelong painter, that wasn't an option.

PITNET's Dr. Fiona Costello, a neuro-ophthalmologist, knew that surgery was the only thing that would save the senior's vision.

"The nature of the vision problem is that it's often slow and people don't realize it's happening," says Dr. Costello. "I often wonder if people's vision issues contribute to their fall."





Neurosurgeon Dr. Yves Starreveld and neuro-ophthalmologist Dr. Fiona Costello reunite with Lorraine Bysterveld during a checkup at the Eye Clinic at Rockyview General Hospital.

In fact, many PITNET patients are only diagnosed because of other presenting issues, such as a fall.

Dr. Costello called in PITNET colleague Dr. Yves Starreveld and the decision was made to operate.

"I still cite (Bysterveld) as my favourite example," says Dr. Starreveld, "because people are worried about having this operation when they're 60 or 70 and I say 'we've operated on a lady who was 91.'"

The procedure, which also involved surgeon Dr. Brad Mechor, used an endoscope to remove the bulk of the pituitary tumour and decompress the optic nerve.



The results were life-changing.

"All of a sudden I could see the colours were brighter," says Bysterveld, who spent a few days in hospital recovering.

"I've just been wonderful since."

Daughter Kathleen remembers the entire experience—which took place six weeks before Christmas—and the care her mother received.

"We have Dr. (Robin) Dargie to thank as well," she says.

"Dr. Dargie was very persistent on her seeing Dr. Costello. Had it not been for him then this wouldn't have happened."

Naturally, daughter Kathleen made good on the delayed birthday trip.

"I had three days one-on-one in Oklahoma," says Bysterveld.

"It was wonderful!"

Multi-disciplinary lab focused on novel devices for aneurysm surgery

DR. ALIM MITHA AND HIS

team have only been working together for just over a year, but already they're preparing to shift from theoretical research to manufacturing and implanting stents in their Heritage Medical Research Building lab.

"We've done a lot of work to get us to this level," he says.

Working with rabbit models, the tissue engineering team starts by harvesting stem cells and endothelial cells and culturing them in preparation for seeding.

They're also designing and manufacturing their own stents out of novel materials and using Finite Element Analysis and Computational Fluid Dynamics to study existing endovascular devices.

"Our students are working on main campus half-time and over here half-time," says Dr. Mitha.

"They're learning about the bio-materials over there and then they'll come back here and do testing on some of our equipment."

The result—which will be tested in endovascular surgery to treat brain aneurysms—is truly a team effort.

Dr. Mitha attributes the lab's success to their strong collaboration. "It's really a bringing together of several different disciplines," he says.

In addition to lab manager



From left to right: Salwa Naveed, Cheryl Meek, Amin Adibi, Sabrina Poonja, Dr. Muneer Eesa, Dr. Arin Sen, Mehdi Jamshidi and Dr. Alim Mitha.

Cheryl Meek, Dr. Mitha is leading master's students, bio-medical engineers, neurosurgery residents, a radiologist, a PhD, and a materials expert.

Though they have many challenges ahead, he sees the potential applications in his clinical practice and in patients that end up in the emergency room with a rupture.

"Some of them are very difficult to treat and as we're treating them we say 'I wish we had this such device,' or 'I wish we could make a device more compatible with that particular patient.' "

Both problems are being addressed in the lab.

"We're hoping that the answer is to actually take that patient's own cells and integrate it with the device and implant the device," says Dr. Mitha.

"It's a type of personalized medicine."

As an added bonus, it's hoped the new bio-materials will dissolve over time.

"These patients could potentially be treated for their brain aneurysm and nothing will be left behind."

Calgary spinal neurosurgeons join stem cell transplant trials

AFTER AN INITIAL TRIAL IN

Switzerland, Calgary has joined an international effort to study stem cell transplants in spinal cord injury patients.

The research, which started with a Phase 1 trial, was spearheaded by neurosurgeon and principal investigator Dr. Steve Casha.

"To my knowledge, it's the first stem cell transplant for spinal cord injury in Canada," says Dr. Casha.

"I suspect it's the first cell transplant of any kind for spinal cord injury in Canada."

Co-investigators include spinal neurosurgeons Dr. John Hurlbert, Dr. Bradley Jacobs and Dr. Stephan Du Plessis.

The first trial, designed to determine if the procedure was technically achievable and if it resulted in any negative effects, was limited to two thoracic injury patients who met strict study requirements.

"Not every spinal cord injury patient would necessarily qualify," cautions Dr. Casha.

It's thought that, over the weeks and months following surgery, the injected stem cells boost the spinal cord's ability to repair itself.

"We do know that these cells can become neurons and can become glia, which are the supporting cells of the spinal cord and the brain," explains Dr. Casha.



From left to right: Drs. Gillian Simonett, Chester Ho, Steve Casha, Bradley Jacobs and John Hurlbert.

"But likely the main thing they do is change the environment and allow intrinsic aspects of the spinal cord to function better and perhaps regenerate better."

Because the first phase was not a controlled study—both patients received stem cells—the objectives were very narrow.

"So we don't know—if there's any changes—was that bound to happen anyway, or was that because of the cells?" says Dr. Casha. "A few patients have had some subtle changes, particularly sensory changes, but nothing dramatic and certainly not motor changes."

The Phase 2 trial, which the team has started preparing for, will be focused on the cervical

spine and will study dosing—the number of injections and the volume of injections. And it will be controlled, so the researchers will be looking for differences in outcomes between patients.

The patients will also be treated by Physical Medicine and Rehabilitation, including physiatrists Dr. Chester Ho and Dr. Gillian Simonett.

"Here, if you have even one segment of recovery, you'll see it in the hands," he says.

"If a person has enough function to bend their elbow, but can't use their hand, one segment now means that they can extend their elbow and potentially start using their fingers and have some grip."

Alberta Radiosurgery Centre

Program Leads: Dr. Gerald Lim, Dr. Yves Starreveld

Overview

This program is the first of its kind in Canada and uses a technology called the Novalis system. It is a collaborative effort between the Divisions of Neurosurgery and Radiation Oncology. The technology offers focused radiation treatment for diseases of the brain and spinal cord in single or multiple sessions as appropriate. This avoids lengthy hospital stays associated with standard surgical treatments. By reducing risks of therapy, and a rapid return to normal activities, it offers greater patient satisfaction. Since its inception in 2002, the program has served an increasing number of patients in Alberta and across the western provinces.

Highlights

Referrals to our spine radiosurgery program are increasing. We have started to treat patients with epilepsy, including mesial temporal lobe epilepsy.

Education

The program provides fellowship training for both radiation oncologists and neurosurgeons.

Research

Projects published this year included a review of the ARC experience in the treatment of trigeminal neuralgia and an innovative study on the effect of contouring variability on dosimetric parameters for brain metastases.

Members

Drs. Zelma Kiss, Yves Starreveld, John Wong, Brad Jacobs, Alim Mitha, John Kelly, Gerald Lim, Rob Nordal, Jon-Paul Voroney, Rao Khan, David Spencer, Alana Hudson, Erin Mckimmon, Kari Pickering, Rhonda Manthey, Stacey Allen, Henry Chow, Sarah Blackmore, Darren Graham, Daphne Walrath, Nathan Wolfe

The Hydrocephalus Program

Program Lead: Dr. Mark Hamilton

Overview

In 2003, the University of Calgary's adult hydrocephalus clinic was established with the goal to standardize and enhance the care for adult patients with hydrocephalus. Hydrocephalus patients had typically been assessed and cared for by individual physicians in an unstructured and unfocused clinic environment. The population of adult patients with hydrocephalus is increasing as diagnostic and therapeutic techniques improve identification and survival of treated patients. Hydrocephalus represents a treatable cause for approximately five per cent of adult patients with a diagnosis of dementia.

The University of Calgary Adult Hydrocephalus Program was developed in response to the strengths of the adult hydrocephalus clinic. Targeting the care of adult patients with hydrocephalus in a specialty clinic, has aided in understanding the natural history of adults with untreated hydrocephalus. The program has helped to standardize the treatment strategies for patients with a potential diagnosis of hydrocephalus and it has helped to improve the management of patients with hydrocephalus using shunts and endoscopic techniques. Clinical research is progressing in these areas. The goals of the Adult Hydrocephalus Program are to provide excellent care for adults with hydrocephalus and to improve the care of adults with hydrocephalus through education, research and advocacy.

In 2013, there were approximately 1,300 patients followed in the adult hydrocephalus clinic. There were approximately 800 outpatient assessments and 110 surgical procedures performed. This population includes patients who initially had a diagnosis of hydrocephalus as a child, adults with acute and sub-acute hydrocephalus, adults with previously untreated congenital hydrocephalus and patients with idiopathic normal pressure hydrocephalus.

Highlights

- Continued expansion of the hydrocephalus clinic.
- Startup of the Adult Hydrocephalus Clinical Research Network (AHCN). Dr. Hamilton is the Principal Investigator for the Network with two centres in Canada and four in the US.

- Graduation of the first adult hydrocephalus Fellow who now works in the clinic.
- Dr. Hamilton led a hydrocephalus course at the Canadian Neurological Sciences Federation meeting held in Ottawa in June 2012 and in a stand alone course in Toronto in June 2014.
- The development of a Canadian hydrocephalus strategy continues with efforts to create a Canadian Hydrocephalus Association.
- Dr. Hamilton joined the Board of the Hydrocephalus Association

Education

The Hydrocephalus Program offers fellowship training for neurosurgeons interested in subspecialty training in the diagnosis and management of adult patients with hydrocephalus. The first trainee completed his fellowship training in June 2012.

Research

- Initiation of the Adult Hydrocephalus Clinical Research Network
- Neuroendoscopy treatment and outcome for adult patients with hydrocephalus
- Neuropsychological effects of endoscopic treatment of patients with hydrocephalus
- Infections in patients with ventricular catheters and shunts
- Treatment of patients with idiopathic normal pressure hydrocephalus
- Transition care for pediatric patients with hydrocephalus
- Endoscopic management of patients with ventricular brain tumours

Members

Neurosurgeons: Dr. Mark Hamilton,
Dr. Clare Gallagher, Dr. Walter Hader

Medical and Surgical Assistant: Dr. Geberth Urbaneja

Neurologist: Dr. David Patry

Neuro-ophthalmologists: Dr. Fiona Costello,
Dr. Bill Fletcher, Dr. Suresh Subramaniam

Geriatrician: Dr. David Hogan

Nurse Practitioners: Ron Prince, Lorna Estabrooks

Image-Guided Medical Robotics Program

Program Lead: Dr. Garnette Sutherland

Overview

The Intraoperative MRI (iMRI) Program uses a ceiling mounted 3.0T magnet. The system has been used in neurosurgery in over 750 cases. Together with the original 1.5T iMRI system, the case number is now over 1,750. Several years ago, this technology was spun into a company called IMRIS that now has 55 international sites with over 10,000 cases worldwide.

Into this environment we have integrated an image-guided robot called neuroArm. The robot has now been used in over 60 cases. Over the past several years, the commercial version called SYMBIS has been developed and will be made commercially available by IMRIS.

Highlights

The project continues to expand. We were successful in obtaining funding for an engineer through the University of Calgary Eyes High Postdoctoral fellowship program. This allowed the recruitment of an outstanding engineer, Dr. Yaser Maddahi, from the University of Manitoba. Maddahi has taken a leadership role towards the development of an MR compatible haptic hand controller to be used to assess brain function using functional MRI (fMRI) during the performance of virtual surgery.

In order to advance the design of robotic tool technology here in Calgary, we were able to attract Dr. Ahmad Ghasemloonia from Newfoundland & Labrador for a post-doctoral engineer position beginning September 2014. With his background in design analysis, Ghasemloonia will be instrumental in the concept and design aspect of robotic tools as they relate to both head and neck surgery and neurosurgery. Through ongoing collaborations with Dr. Joseph Dort, Head and Neck Surgery, Ghasemloonia will work with clinicians and engineers specifically towards the design and development of 1. Articulated wrist tool for robotic surgery and 2. Tissue interrogator for real time molecular characterization of tissue, e.g. tumours, in the operating room. Upon completing the preliminary and critical design reviews, the project aims to rapidly build prototype models, initially using the 3D printer available at our site, leading to choice material selection for final prototype.

This past summer, we were also able to consolidate our collaboration with Dr. Sonny Chan, Assistant Professor Computer Science-University of Calgary, who recently relocated to Calgary upon his graduation from Stanford University. Chan's expertise involves designing surgical simulation platforms with characteristic haptic interface. Well aligned with Project neuroArm's vision in advancing surgeon training and education through virtual reality and simulation paradigms, Chan has already begun preliminary work towards identifying select surgical cases, fusion of CT imaging data on to his software algorithm and producing a patient specific brain tumour simulation program for planning and performance of surgery. A neurosurgery resident Dr. Andrew Ryu, PGY 3, has assumed the clinical counterpart in providing both knowledge and feedback towards the development of such a platform. Ryu will not only contribute in the initial design, but also recruit multiple surgeon trainees and staff for testing and validation of these simulation platforms once completed.

Through Chan, we are working with academic leaders in surgical simulation at Stanford University, the Ohio Supercomputer Center, the University of Western Ontario, and University of Alberta to develop the next generation virtual surgical environments. Data communication and networking have the potential to make our multiple simulation technologies even more powerful.

Selected International Presentations

1. Third Neuro-Spinal and Neuro-Interventional Conference. Advancing Neurosurgery through Technology. Harbin, China, Sept. 20, 2013.
2. Visiting Professorship: Neurosurgery Grand Rounds. Neurosurgery presents.... from idea to Clinical Integration. Seattle, Wash., Oct. 3, 2013.
3. 2nd Annual Brain Surgery Simulation Symposium. Robotics in Neurosurgery. New York, N.Y., Nov 9, 2013.
4. 2nd Annual Miami Neuro Symposium. Advancing Neurosurgery through Image-guided Robotics. Coral Gables, Fla., Dec 7, 2013.
5. The 8th Annual Meeting of the Saudi Arabian Neurological Surgery. From Idea to Clinical Integration... a neurosurgical odyssey. Riyadh, Saudi Arabia, April 15, 2014.

6. International Space Station Utilization Senate Update. Advancing Neurosurgery through Space Technology. Russell Senate office Building, Committee Hearing Room 253, Washington D.C., USA, May 1, 2014.
7. ACAMP Symposium. neuroArm: An Image-guided Robot for Neurosurgery. Calgary, June 9, 2014.

Recognition

neuroArm and Dr. Garnette Sutherland were inducted into the Space Technology Hall of Fame at Colorado Springs in May 2014. Together with institutional inductees Macdonald Dettwiler and Associates, the Canadian Space Agency, IMRIS Inc. and the University of Calgary, this recognition consolidates this idea that originated at the University of Calgary and reflects the tremendous support provided by the Calgary philanthropic community together with support from provincial and national funding agencies.

Education

International Tractography Workshop: In February 2014, Project neuroArm consolidated a collaboration with the University of Vienna towards the establishment of the first International Tractography Workshop in North America. The workshop, chaired by Dr. Garnette Sutherland and co-ordinated by Dr. Sanju Lama, hosted 12 participants, including neurosurgeons from North and South America and faculties from the University of Vienna.

NeuroNight: To explore potential collaborations, Project neuroArm hosted an evening open house event to showcase neuroscience technologies developed or being developed by Project neuroArm and Stryker Corporation. The evening brought together faculty residents and nurse clinicians of the Departments of Clinical Neurosciences and Surgery, together with policy makers and engineers from Stryker.

Research

Haptic Hand-controller: A vital component of a robotic system is the human-machine interface, and in particular a haptic hand-controller, itself a small robot. Under the leadership of Dr. Kourosh Zareinia,

Chief Engineer-Project neuroArm, we propose to utilize our considerable experience in both medicine and engineering to design and develop a neurosurgery specific haptic hand-controller. Such a hand-controller is need-based and is not presently available. Intellectual property arisen from the project will allow creation of a spin-off company and jobs here in Alberta.

Molecular imaging: Building upon our past accomplishment in developing brain tumour specific single domain antibody-nanoparticle complexes, Dr. Sanju Lama, PhD candidate provided a leadership role in consolidating investigators from across Canada (Mehdi Arbabi-NRC Ottawa, Frank van Veggel-UVictoria, Boguslaw Tomanek-UCalgary and Michael Colicos-UCalgary) towards achieving something very special, i.e. the development of an MR visible biomarker for traumatic brain injury that does not presently exist. This research direction is important and has relevance in robotics, as through visualization of abnormal cells, robotic technology can be utilized for image-guided therapy in the operating rooms.

Surgical Simulation: State-of-the-art virtual environments allow surgeons to practice complex and difficult procedures within the safety of a computer simulation. Computer haptics and immersive 3D display technologies allow the surgeon to see, touch, and surgically manipulate a virtual model of the patient. Through Sonny Chan, the present simulation direction in our laboratory is well suited to expand the international connectivity amongst centres such as Stanford, Ohio State, London, Ont., and Edmonton.

Members

Kourosh Zareinia, Liu Shi Gan, Sanju Lama, Yaser Maddahi, Ahmad Ghasamloonia, Sonny Chan, Stefan Wolfsberger, Chris Macnab, Qiao Sun, Boguslaw Tomanek, Fang Wei Yang, Pam Leblanc, Alison Shepherd, Roger Mackenzie, Mehdi Arbabi, Frank van Veggel, Armita Dash, Michael Colicos, Stephanie Stotz

Industrial Partners

MDA (Brampton, Ontario)
IMRIS (Minnetonka, Minnesota)

Neuromodulation Program

Program Lead: Dr. Zelma Kiss

Overview

Neuromodulation is the altering/modulation of the nervous system function by means of implantable devices or neural prostheses. It includes peripheral nerve, spinal cord and brain electrical stimulation, as well as drug delivery devices. Numerous conditions are treated including: movement disorders, epilepsy, pain, angina, treatment refractory depression, headache, spasticity, gastroparesis and urinary incontinence. Other divisions within DCNS, as well as specialists from many other departments, are part of the program.

Clinical Care

The adult pump program follows 31 patients with baclofen pumps for spasticity related to spinal cord injury due to trauma or MS. Six new patients were implanted this year. With the anticipated influx of children graduating from the Alberta Children's Hospital pump program, the adult and pediatric groups have been planning the development of a specialized clinic to manage this group with cerebral palsy. The sacral nerve stimulation program continues to be a unique clinical service in Western Canada. They assessed 16 patients, implanted two and replaced six batteries.

The movement disorders program received 42 new referrals, implanted 17 patients, replaced 10 batteries and follows 114 people in total. The Chronic Pain Centre (CPC) pain program received 22 new referrals, implanted nine new patients and follows almost 100 with implanted devices. The Deep Brain Stimulation (DBS) for treatment resistant depression program implanted three patients, all of whom are proceeding through our clinical trial examining imaging and chemical biomarkers of responsiveness. The first patient is already in remission.

Education

Our training program attracts residents, summer and graduate students, and post-doctoral Fellows. Dr. Yarema Bezchlibnyk, a mid-year resident in neurosurgery, joined the Therapeutic Brain Stimulation lab for the year and Dr. Keith Gomes completed his fellowship in stereotactic and functional neurosurgery. The movement disorder neuromodulation nurses attended a DBS day

sponsored by Medtronic in Toronto and trained a fourth year nursing student on this technology. The Pain program suffered from staffing turnover, so we held only one Pain Neuromodulation Journal Club this year. Dr. Chris Spanswick educated our Department by presenting on the Neuromodulation Pain program at Neurosurgery Rounds in October 2013.

Research

We published and presented papers on DBS in PLoS One, J Neurol Neurosurg Psychiatry, J Neurosci Methods, IEEE Biomedical Circuits and Systems, as well as a letter to the CMAJ entitled "Off-label use of deep brain stimulation for treatment resistant depression". Our trainees had platform presentations on DBS at the Canadian Congress of Neurological Sciences and the American Society for Stereotactic and Functional Neurosurgery, posters at the Canadian Neuromodulation Society and the Neural Interfaces Conference. Faculty presented at the American Headache Society, International and Canadian Colleges of Neuropsychopharmacology meetings in Vancouver and Banff, respectively, in addition to courses at the Congress of Neurological Surgeons, North American Neuromodulation Society, and a visiting professor talk at Dalhousie University. We continue to study occipital nerve region stimulation for craniofacial pain and headache syndromes in a prospective research protocol.

Future Directions

We are still developing a new web-based secure database for movement disorder surgery patients with the support of Rose Family Funds and the Hotchkiss Brain Institute. We continue to recruit subjects with treatment resistant depression for our AIHS CRIO Project. Our cohort study of occipital and peripheral regional stimulation continues to enroll patients with headache and other craniofacial pain syndromes.

The CPC program continues to collect data for outcome measures and come up with a method to collate these data for presentation. A new faculty member with a special interest in pain neuromodulation is starting this coming academic year.

Members

Cardiology: Dr. Jim Stone

Gastroenterology: Drs. Christopher Andrews,
Phil Mitchell

Neurology: Drs. Werner Becker, Scott Kraft,
Neelan Pillay, Jong Rho, Sam Wiebe

Neurosurgery: Drs. Zelma Kiss, Mark Hamilton,
Walter Hader

Nursing: Cheri Gray, Colleen Harris, Deb Hartlieb,
Brittany Hoffarth-Palchewich, Karen Hunka,
Jackie Martini, Valerie Sherwood, Pia Lawrence,
Raj Parmeer, Meredith Wild

Pain physicians: Drs. Darryl Guglielmin,
John Pereira, Martin Scanlon, Kelly Shinkaruk,
Chris Spanswick (Chronic Pain Centre),
Peter Farran (ACH)

Physical Medicine and Rehabilitation:

Drs. Dan McGowan, Gillian Simonett

Physiotherapy: Cliona Corbett

Psychiatry: Drs. Jeremy Quickfall, Raj Ramasubbu,
Aaron Mackie

Psychology: Drs. Arlene Cox, Angela Haffenden

Urogynecology: Drs. Magali Robert, E. Brennand

Neurovascular Program

Program Lead: Dr. John Wong

Overview

The Neurovascular Program is a joint collaborative effort of specialists and allied healthcare staff from multiple disciplines to combat stroke and neurovascular disease. Many patients are treated in a single day using minimally invasive endovascular approaches, thereby avoiding long hospital stays. Expertise is maintained in the provision of open cerebrovascular neurosurgery to Albertans. In conjunction with our internationally recognized stroke team, the Neurovascular Program has become an important partner in stroke care and research.

Highlights

Approximately 700 patients with neurovascular disease were seen in the past year in our specialized outpatient clinic for evaluation and followup. Currently, about 250 patients are treated annually via minimally invasive endovascular means such as aneurysm coiling, vascular malformation embolization, carotid stenting and endovascular stroke treatment. An integrated relationship with the Alberta Radiosurgery Centre, which was the first to use special shaped-beam focused radiotherapy techniques in Canada, has allowed the non-invasive and safe treatment of patients with complex arteriovenous malformations. Over the years we have consolidated the outpatient experience and launched the Neurovascular Clinic in Calgary in conjunction with specialists from neurosurgery,

neurology, radiology and nursing. This has allowed the rapid same-day triage and evaluation of stroke patients to provide high-quality care and further opportunities for teaching and clinical studies.

Education

Educational highlights have included the recruitment of two clinical Fellows in endovascular training and one Fellow in open neurosurgical techniques.

Research

Academic initiatives have centred upon the development by Dr. Alim Mitha of a basic science laboratory dedicated to the development of new intravascular devices for stroke care and the Calgary-led international multi-centre randomized study of acute stroke intervention (ESCAPE) led by Dr. Mayank Goyal from Interventional Neuroradiology and Drs. Michael Hill and Andrew Demchuk from Stroke Neurology.

Members

Drs. John Wong, Alim Mitha, Garnette Sutherland,
William Morrish, Mayank Goyal, Muneer Eesa

Nursing: Leslie Zimmer, Michelle Gillies

Fellows: Drs. Parviz Dolati, Mohammed Almekhlafi,
Rene van Dijk

Pediatric Neurosurgery Program

Program Lead: Dr. Walter Hader

Overview

The Pediatric Neurosurgical Program offers all aspects of neurosurgical care in children including: management of hydrocephalus, brain and spinal injury, myelomeningocele, other forms of spinal dysraphism, refractory epilepsy surgery, spasticity, craniofacial disorders, and pediatric brain tumour. All members primary affiliation is with the Department of Clinical Neurosciences while the neurosurgery section operates within the Division of Pediatric Surgery at Alberta Children's Hospital.



Dr. Walter Hader

Highlights

Pediatric neurosurgery continues to be active in the Calgary Epilepsy Program, performing 25 procedures for intractable epilepsy in children yearly.

Dr. Hader was an invited instructor at a full day Epilepsy Surgery Workshop where he discussed technical aspects of corpus callosotomy during the American Association of Neurological Surgeons Pediatric Section Meeting in Toronto, December, 2013. He also participated in an International Tractography Workshop at the University of Calgary in February 2014, where he discussed applications of tractography to Epilepsy Surgery. The workshop was organized by Dr. Garnette Sutherland.

Dr. Gallagher participated in a international Consensus conference on Microdialysis for Traumatic Brain Injury, from which the first ever guidelines for applications will follow in the upcoming year.

Research

The Pediatric Neurosurgical Division members participate in local and national administrative and educational functions. They also lead and collaborate in clinical research involving: pediatric and adult hydrocephalus, pediatric brain injury, epilepsy and brain tumour. Publications over the past year by its members have been in the areas of Functional MRI, reliability of Diffusion Tensor Imaging and maturation of pediatric brain tumours after chemotherapy. The Pediatric Neurosurgery Division is an active participant of the Canadian Pediatric Neurosurgery research study group. Dr. Gallagher continues to participate in an international collaboration assessing cerebral energy metabolism in injured and uninjured brains utilizing novel techniques of MR spectroscopy.

Members

Neurosurgeons

Dr. Walter Hader
Dr. Clare Gallagher
Dr. Mark Hamilton

Pediatricians

Dr. Heather Graham
Dr. Keith Jorgensen

Nurse Practitioner

Kelly Bullivant

Nurse Clinicians

Valerie Sherwood
Linda Gill

Peripheral Nerve Program

Program Lead: Dr. Rajiv Midha

Overview

The Surgical Peripheral Nerve Program within the DCNS, is a multi-disciplinary and inter-disciplinary program encompassing clinical, physiotherapy and electro-diagnostic services. Our program focuses on the diagnosis and treatment of a variety of peripheral nerve problems including: complex peripheral nerve injuries, nerve tumours, brachial plexus surgery and advanced nerve repair and nerve transfer techniques. Our goal is to minimize pain and to maximize function, providing a better quality of life for patients living with these painful and sometimes disabling disorders.

Highlights

The multidisciplinary peripheral nerve clinic continues to expand its scope at the South Health Campus, with once a month full day clinics.

Education

We support the educational initiatives of all residents within the three clinical divisions of DCNS and have a robust fellowship program. The following are recent Fellows within the Program:

Dr. Helene Khoung (2010-12)
Dr. Ferry Sanjaya (2011-12)
Dr. Chandan Mohanty (2012-2013)
Dr. Tarek El Madhoun (2014)

Research

Research is an important aspect of the Peripheral Nerve Program. Over the last few years, we have been conducting a clinical randomized control trial comparing surgical decompression to the best medical management for ulnar neuropathy at the elbow. Dr. Midha runs an independent basic science research laboratory in association with the Hotchkiss Brain Institute investigating various facets of peripheral nerve regeneration and repair. For more information on these research initiatives go to: www.hbi.ucalgary.ca or www.ucalgary.ca/spinalnerve.



Members

Medical Neurologists, Psychiatrists &
Electrodiagnostics

Dr. Chris White
Dr. Stephen McNeil

Neurosurgeon
Dr. Rajiv Midha

Plastic Surgeons
Dr. Christiaan Schrag
Dr. Robertson Harrop

Physiotherapy
Margaret Hass

Intraoperative Electrophysiology Support
Michael Rigby
Erin Phillip

PITNET

Program Leads: Dr. Fiona Costello, Dr. Yves Starreveld

Overview

The Pituitary Inter-disciplinary Team-based Endocrine Treatment Program (PITNET) has been active for over two years, bringing together neurosurgery, neuro-ophthalmology, otolaryngology and endocrinology to facilitate the care of patients with pituitary tumours.

Highlights

- Our combined neurosurgery/neuro-ophthalmology new patient and followup clinic have reduced clinic visits for many patients.
- David Adair has embarked on his Masters of Science to develop a novel image guidance system for endoscopic pituitary surgery.
- The PITNET team is working with Guideline Utilization Resource Unit (GURU), CancerControl Alberta, to revise existing guidelines in the management of pituitary tumours.

Education

Due to the high concentration of surgical patients, we have been able to provide focused training on the diagnosis and management of these lesions to residents and visiting neurosurgical Fellows, including Dr. Jason Papacostas from Brisbane, Australia.

Research

Current research directions are focused on cost-effectiveness, the role of optical coherence tomography in patient followup, comparisons of surgical approaches, and (with the Department of Anesthesia) the assessment of post operative nausea and vomiting in this patient group.

The very first publication on cost-effectiveness analysis was recently published by the team.

Members

Endocrinology

Dr. Shelly Bhayana, Dr. Bernard Corenblum, Dr. Alun Edwards, Dr. Munish Khosla, Dr. Sue Pedersen, Dr. Doreen Rabi

Neurology

Dr. Fiona Costello, Dr. Bill Fletcher, Dr. Lawrence Korngut, Dr. Michael Hill, Dr. Suresh Subramaniam

Neurosurgery

Dr. Garnette Sutherland, Dr. Alim Mitha, Dr. Yves Starreveld

Otolaryngology

Dr. Brad Mechor, Dr. Luke Rudmik

Skull Base and Endoscopic Surgery Program

Program Lead: Dr. Yves Starreveld

Overview

In conjunction with colleagues from the Division of Otolaryngology, the skull-base surgery group combines long experience with novel approaches to offer patients the best surgical treatment and long-term followup for these challenging lesions.

In addition, close ties to both endocrinology and the Alberta Radiosurgery Centre ensure that the nonsurgical aspects of treatment are also managed

appropriately. Endoscopic approaches to pituitary and anterior skull base lesions are also offered when appropriate.

Education

The program offers fellowship training to neurosurgeons. This year we were fortunate to attract Dr. Jason Papacostas from Brisbane, Australia to spend a year with us.

The Surgical Neuro-oncology Program

Program Lead: Dr. Mark Hamilton

Overview

As a multi-disciplinary program in DCNS, the Surgical Neuro-oncology Program was established to focus on neurosurgical care for brain tumour patients. The program provides excellent care for patients with brain tumours and it improves care in the future through education, research and advocacy.

Our patients have both low grade and malignant brain tumours, including those involving the brain and the skull base. Neurosurgeons work in concert with neuro-oncologists, neuroradiologists, neuropathologists, and radiation oncologists specializing in the treatment of brain tumours. Regular clinical meetings and teaching rounds occur to co-ordinate care plans for patients. We are also able to offer access to unique treatment modalities such as the intraoperative MRI theatre for assisting in the surgical treatment of brain tumour and intraoperative monitoring or cortical mapping for complex brain tumour resection.

Our program provides:

- Surgical treatment of patients with malignant brain tumour
- Surgical management of patients with low-grade glioma
- Clinical trials for adjuvant treatment of patients with malignant brain tumour
- Treatment wait times and outcomes for brain tumour patients
- Endoscopic treatment of patients with skull base or pituitary tumours

Education

The program provides fellowship training for neurosurgeons who want to develop special skills in surgical neuro-oncology.

Research

Members of the program are actively involved in clinical research to test new and innovative therapies to treat patients with brain tumours. Dr. Hamilton and Dr. Kelly are members of the Clark H. Smith Brain Tumour Centre, The Southern Alberta Cancer Research Institute, and the Hotchkiss Brain Institute as well as, participants in the Terry Fox Research Initiative. All neurosurgeons are participants in multi-centre clinical trials, including those involving convection-enhanced delivery of agents into the brain to treat brain tumours and brain tumour vaccines. In addition to this, the Brain Tumour Tissue Bank is available to store tissue from consenting patients for current and future research.

Members

Neurosurgeons: Dr. Mark G Hamilton,
Dr. Yves Starreveld, Dr. John Kelly,
Dr. Garnette Sutherland

Neuro-Oncologists: Dr. Jay Easaw,
Dr. Paula de Robles, Dr. Greg Cairncross

Radiation Oncologists: Dr. Rob Nordal, Dr. Gerald Lim

Nurse Clinician: Crystal Tellett

Research Associate: Ish Bains

Research

A warm welcome to David Adair who is embarking on his Masters of Science in developing a novel image guidance system for endoscopic surgery.

Specific research includes:

- clinical epidemiology, image guidance, robotic surgery and surgical simulation;
- a randomized trial comparing different

- endoscopic approaches to pituitary tumours; and
- a retrospective analysis of postoperative nausea and vomiting following endoscopic skull base surgery; being performed in collaboration with the Department of Anesthesia.

Members

Alim Mitha, Garnette Sutherland, Joe Dort,
Brad Mechor, Phil Park, Luke Rudmik, Erin Phillips,
Michael Rigby

The Division of Physical Medicine & Rehabilitation

Dr. Chester Ho

THE DIVISION OF PM&R HAS 24 MEMBERS, working in diverse settings from tertiary acute care hospitals to community practice. Our practice focuses on the diagnosis, management and rehabilitation of patients with neurological conditions (e.g. brain injury, spinal cord injury, stroke) to those with musculoskeletal problems (e.g. back pain, burn injuries, amputation).

We serve the needs of both children and adults in southern Alberta, eastern British Columbia and western Saskatchewan.

We continue to build capacity for our clinical and education programs, develop our rapidly expanding research programs and strengthen our collaboration with community partners.

Recruitment



Dr. Leung

Dr. Gentson Leung (stroke rehabilitation, amputee rehabilitation, general physiatry, EMG) joined our division in 2013. He is a graduate of our residency program. Dr. Leung is based at Rockyview General Hospital and the Dr. Vernon Fanning Centre.

Education

- **Postgraduate medical education training** – there are 10 residents in the PM&R program. We filled two first-year positions from the CaRMS match.
- **Royal College examination** – both graduating residents (Drs. Jordan Raugust and Vishal Tulsi) passed the Royal College exams, maintaining the 100% pass rate for the UofC PM&R residency program.
- **Education conferences** – our division hosted the first Performance Arts Medicine Conference in Western Canada at the UofC in December 2013 (co-chairpersons Dr. Chester Ho and Dr. Noorshina Virani), with funding support from Alberta Innovates Health Solutions, Chronic Pain Centre Education Foundation and the Hotchkiss Brain Institute. Dr. Brian Benson was the lead of the Blood Monitoring Workshop at the 2014 National Sport Science, Medicine Advisory Committee (NSSMAC) Workshops in Toronto, Ont.
- **Patient education program** – the Spinal Cord Injury Rehabilitation program obtained a grant from the Craig Neilsen Foundation to enhance its multi-disciplinary, multi-faceted patient education program, together with Spinal Cord Injury Alberta.



Research

- **Research grant application success** – our Division's research portfolio continues to expand rapidly. Highlights of this year's success include: Dr. Sean Dukelow's "Stroke Deficits and Robotic Technology II (RESTART II)" grant (\$843,556 over five years) by Canadian Institutes of Health Research; Dr. Chester Ho's "Neurorehabilitation Program, UCAN initiative" grant (\$114,970 over one year) by Hotchkiss Brain Institute; and Dr. Brian Benson's "Innovations 4 Gold Research Funding: KINARM End-Point Robotic Device with Gaze Tracking and Vestibular Module" (\$202,510) by Own the Podium, Canada.
- **AIHS CRIO leadership** – Dr. Chester Ho is the Project Lead of the W21C: Interdisciplinary Research and Innovation for Health System Quality and Safety's Project A: Efficacy of a pressure-sensing mattress system for preventing pressure ulcerations in vulnerable patient populations – a randomized controlled trial.
- **Development of neuro-rehabilitation research programs** – our division has been collaborating with Dr. Patrick Whelan and the Hotchkiss Brain Institute with the goal to develop a bench-to-bedside neuro-rehabilitation research program in Calgary. This program is complemented by our participation in the Campus Alberta Neurosciences' Neuro-injury provincial initiative.
- **Research trainees** – our diverse research portfolio includes six post-doctoral Fellows (including two "Eyes High" Fellows in the Burns Rehabilitation Research Program), three PhD students, three undergraduate students, three summer students, and one high school student.

Clinical Care

- **Development of Calgary-wide Functional Electrical Stimulation (FES) cycling program** – through collaboration with Spinal Cord Injury Alberta (formerly known as Canadian Paraplegic Association), University of Alberta Steadward Centre, University of Calgary Faculty of Kinesiology, Mount Royal University, the Amanda Project and the Calgary Health Trust, the Spinal Cord Injury (SCI) Rehabilitation team has developed a city-wide FES cycling program for persons with SCI. This is an evidence-based exercise modality that aims to improve the cardiovascular fitness and muscle strength of persons with paralysis. It was previously not available in Alberta Health Services or community fitness centres in Calgary. The collaborative effort of this group has led to philanthropic support that allowed the development of this innovative program, which is now in clinical use at the Foothills Medical Centre and in the Spinal Cord Injury Alberta fitness centre.
- **Partnership with Alberta Health Services (AHS) Strategic Clinical Networks** – our division members continue to be actively participating in Strategic Clinic Network activities. Drs. Noorshina Virani and Pam Barton have been working closely with the AHS Bone & Joint Strategic Clinical Network for a proposal to enhance spine care in the province. Dr. Sean Dukelow has been involved with the Cardiovascular Health and Stroke Strategic Clinical Network, advocating for evidence-based practice in stroke rehabilitation in the province.
- **Leadership development** – Dr. Brian Benson became the Chief Medical Officer and Director of Sport Medicine at the Canadian Sport Institute.



Physiotherapist Jackie Kilgour works with spinal cord injury patient Roger Benson on the FES bike after attaching electrodes to him.

Photo credit: Colin Zak

Rehabilitation bike program links universities and community groups

YOU'D NEVER GUESS ROGER BENSON

is paralyzed below the waist as he pedals his stationary exercise bike.

The 55-year-old Calgary man – who has been in a wheelchair since a motocross accident this past April—is able to stay active and exercise his legs thanks to a new rehabilitation tool: the FES (Functional Electrical Stimulation) bike.

“I can’t feel my legs and don’t control the pedals but it feels good to have my legs move,” Benson says. “My legs actually feel tired, which is tremendous.”

After a spinal cord injury, the brain is often unable to send messages through the spinal cord to the muscles. With the FES bike, electrodes are attached to the surface of the skin of the arms or legs, and the electrodes stimulate the muscles, causing them to contract and create a cycling motion on the foot pedals or hand cranks.

“It feels like a buzzing through my legs down to my feet,” Benson says. “The FES bike helps me maintain muscle tone and mass. After just six 30-minute sessions, I’m already seeing muscle definition in my legs.”

Located at Foothills Medical Centre (FMC), the FES bike is the first of its kind in Calgary and one of four such bicycles at Alberta Health Services (AHS) facilities in the province. (Similar bikes are in operation at Red Deer Regional Hospital Centre, Glenrose Rehabilitation Hospital in Edmonton, and Lacombe Hospital and Care Centre). In Calgary, purchase of the FES bike was made possible thanks to funds from the Calgary Health Trust.

While the bikes have been used in other areas, what’s unusual is how the Calgary program is being developed, says Dr. Chester Ho, Division Head of Physical Medicine and Rehabilitation.

“We’re trying to do a very organized approach ... and we’re also working with the Steadward Centre at the University of Alberta to try to design a program for the province.”

Dr. Ho says the collaboration between universities and community groups like the Canadian Paraplegic Association is unique.

“Certainly in Canada, no one else is doing this service delivery model as systematic as we are.”

The first bike was installed at FMC, where patients with new injuries are tested, and one bike is installed at the Canadian Paraplegic Association for ongoing rehabilitation after discharge. A third bike is planned for the University of Calgary’s Disability and Rehab Program, says Dr. Ho.

“We’re hoping to get more funds to buy maybe a couple more after that.”

Each year, there are 140 people with new spinal cord injuries in Alberta—approximately one-third of them in Calgary.

“The FES bike is an exciting new piece of equipment for southern Albertans. It’s exciting to see patients using it and benefiting,” says Jackie Kilgour, a physiotherapist with the Spinal Cord Injury Team at Foothills Medical Centre.

In the past, a similar bike was used for patient rehabilitation that produced passive movement via a motor, which meant there was no activation of muscles.

Kilgour says the FES bike has four main benefits for patients: it builds increased muscle mass, which helps prevent pressure sores; it improves circulation and skin health; it increases range of motion, and improves cardiovascular health.

The device can also aid in the rehabilitation of patients who have suffered other neurological conditions, such as strokes or brain injuries.

“If I ever do stand again, I’ll already have that muscle bulk I need, thanks to the bike,” Benson adds. “Since I’ve been on the machine, I’ve been able to move the muscles in my quads a bit on my own. I attribute that to using the bike. It gives me hope.”

Clinicians, scientists gather from across province to share research

IT'S DIFFICULT FOR PHYSIATRISTS, neurologists and neurosurgeons to keep tabs on each others' work even when they work in the same department of the same university.

But without those connections, critical research isn't discussed, experiences aren't shared and collaboration on new ideas isn't started.

That's precisely what Campus Alberta Neuroscience was created to do, and it's most recent event, AlbertaNeuro 2014, was held in October.

The network, which links universities in Calgary, Edmonton and Lethbridge, brought 200 specialists together at the University of Alberta to discuss "The Road to Rehab and Beyond."



**Campus Alberta
Neuroscience**

Dr. Chester Ho, Division Head of Physical Medicine and Rehabilitation, was on the organizing committee and moderated a session at the event.

"We're trying to join the three campuses together so the three programs will work together to create more synergy," says Dr. Ho.

In addition, he says, the network helps researchers at the three universities when applying for grants.

"When we work together, the funding opportunities will be much better than if the three separate campuses are trying to do their own thing."

A number of members from the division of Physical Medicine and Rehabilitation were invited to speak at the conference, including Dr. Sean Dukelow and Dr. Chantel Debert.

Dr. Debert, who presented "A Clinical View of Motor Rehabilitation Following Traumatic Brain Injury," says the first AlbertaNeuro symposium was a huge success.

"It really brought a lot of clinicians and basic scientists together to start talking about clinical research and basic science research that can transfer from bench to bedside."

The event opened a lot of doors, says Dr. Debert.

"I could find out what basic scientists are doing from a research perspective," she says, "and they could see how that clinically translates to patients and what I'm doing."

"The first of hopefully many meetings," says the physiatrist.



Physiatrist ensuring DCNS has prominent role on national stage

LIKE MANY MEMBERS OF

the Department of Clinical Neurosciences, Dr. Rodney Li Pi Shan is a master of calendar juggling.

Not only does the Calgary Brain Injury Program keep him busy with inpatients, outpatients and consults, but he also visits the



Dr. Li Pi Shan South Health Campus once a month to assist at the ALS clinic. In addition, the clinical associate professor also teaches residents, performs electromyography, and sees spasticity patients.

Over the past year, Dr. Li Pi Shan, who joined the Department as a physiatrist in 2010, has somehow also found the time to take on the role of president of the Canadian Association of Physical Medicine & Rehabilitation.

Although he has been involved with the CAPM&R for over the past ten years, “it has been a steep learning curve over the last year,” he says.

“Approximately two years ago the decision was made to separate from Royal College Association Management, and

**I believe that
being involved
also keeps us in
the loop in terms
of what is happening
nationally, and it
also gives us a
say at the table.**

— Dr. Rodney Li Pi Shan



so there was tremendous work involved in getting us to where we are today.”

Dr. Li Pi Shan says the commitment has allowed him to connect with other specialists nationally and internationally.

“It is nice to be involved with activities on a national scale

and to try to make a difference for physiatrists, residents and medical students across the country,” he says. “I believe that being involved also keeps us in the loop in terms of what is happening nationally, and it also gives us a say at the table.”

His generous contribution, along with that of colleague Dr. Stephanie Plamondon, continues a tradition of DCNS participation with the CAPM&R.

“Stephanie and I represent Calgary on the CAPM&R executive when we go to the meetings. And it is not only the two of us,” he adds.

“Several prominent members of DCNS including Dr. Pam Barton, Dr. John Latter, Dr. Stephen McNeil and Dr. Gillian Simonett have also played prominent roles in CAPM&R. In addition, at the annual meeting, we have always had great attendance and support from our staff, residents, and medical students.”

Though his two-year term as president ends next year, Dr. Li Pi Shan’s calendar will undoubtedly remain as full as ever.

“It has always been in my nature to be involved and I hope to be able to contribute to a variety of organizations in the future.”

Amputee Rehabilitation Program

Program Lead: Dr. Kenneth Lam

Overview

The Amputee Rehabilitation Program provides comprehensive care to patients with limb loss across the continuum of care. Both inpatient and outpatient services are provided. In 2013, over 100 new patients with limb loss entered the program. Amputation occurs at all hospital sites so peri-amputation consultative services are provided city-wide. One of the key components of this program is to optimize the timing and level of amputation by close partnership with our surgical colleagues.



Dr. Kenneth Lam

in managing complex amputees. Those with hemipelvectomies and high above knee amputation are receiving the latest prosthetic components like microprocessor knee and novel socket designs. The program is ordering a 3D printer for education and rapid prototyping.

Education

The program is dedicated to medical education and training. Physiatry residents complete a mandatory three-month period in the program during their residency. The program is also involved in the education and certification of prosthetists in training. In-service lectures are also delivered to allied health and nursing staff on a regular basis.

Research

Our resident Dr. Les Laplante is researching the perceived need for a community-based exercise program for lower limb amputees.

Members

Dr. Kenneth Kui Sai Lam

Highlights

The Amputee program is actively involved in limb loss prevention by partnering with multiple stakeholders including the Diabetes Strategic Clinical Network and the Sheldon Chumir Wound Care Clinic. By centralizing the outpatient amputee program at one site, we have garnered expertise

The Burn Rehabilitation Program

Program Lead: Dr. Vincent Gabriel

Overview

The burn rehabilitation program continued to expand this year. Renovations to the inpatient burn unit have begun which will remove old equipment and create new space for patient care, staff working areas and an improved family meeting place.



Dr. Vincent Gabriel

Thanks to a generous gift, Dr. Jeff Biernaskie was named the Calgary Firefighters Burn Treatment Society professor in Wound Healing and Skin Regeneration. Several new students and post-doctoral Fellows were recruited to the research program as well.

We plan to begin expansion of our outpatient clinics in the next year.

Dr. Vincent Gabriel and Dr. Duncan Nickerson participated in international outreach this year in Costa Rica and Haiti respectively.

The Calgary Brain Injury Program

Program Lead: Dr. Christine McGovern

Overview

The Calgary Brain Injury Program addresses the rehabilitation needs of individuals with acquired brain injuries which may arise from: trauma, infection, aneurysm rupture, hypoxia, hydrocephalus, or other various causes. The affected individuals have a wide spectrum of severity of injury from mild to severe. We have inpatient and outpatient services. The inpatient service includes:

1. Consultation service for individuals in acute care.
2. Inpatient interdisciplinary rehabilitation service consisting of approximately 15 beds on Unit 58 at the Foothills Medical Centre.

The outpatient service is based upon a centralized referral system which provides triage and access to several services, including:

1. Brain Injury Rehabilitation Clinic which provides assessment and treatment by physiatrists for people with moderate or severe acquired brain injuries. We have a psychiatrist and headache neurologist who provide consultations for us as required, and social workers who provide counselling and support.
2. Referrals for interdisciplinary rehabilitation at Community Accessible Rehabilitation (CAR) for individuals with acquired brain injury and post concussion syndrome.
3. Acute concussion education program which consists of symptom management advice by telephone to individuals affected by concussion within three months of injury. No assessment is provided. Plans are in place to change this to a classroom model of education.

Service

In addition to the above, the Cuming & Gillespie Patient Experience Team has expanded and now includes SynAPSE (SYNcing ABI Peer Support & Education), which is a one-to-one peer support visit service available to inpatients. SABIS (Southern Alberta Brain Injury Society) also runs a once per month peer support group on the Rehabilitation Unit for patients and their families to learn more about integrating back into the community following discharge from hospital.

Education

The 4th Annual Calgary Brain Injury Program Event entitled “Connecting Communities – Summary and Next Steps” was held in February 2014. This brought together stakeholders from across the continuum of care. A keynote address was given by Randy Chevrier regarding personal experience with concussion, and other podium presentations were given in the morning, along with over a dozen poster presentations. This established the background for five breakout groups in the afternoon that addressed planning in areas addressing research, interprofessional practice, brain injury education series, brain injury early supported discharge services, and interagency/ community partners.

“Feed Your Brain” is a series of lunchtime sessions that we run on topics of interest to service providers. These run from Foothills Medical Centre but are shared via telehealth to the Community Accessible Rehabilitation sites. Some of the topics this year have included family intervention, management of spasticity, return to learn, somatosensory intervention in mild TBI, returning to work after brain injury, and caregiving isn't easy to quit.

Grants and Research

Grants have been received from the Canadian Institutes of Health Research, the Department of Clinical Neurosciences, Alberta Health Services, the University of Calgary, and the Hotchkiss Brain Institute, totalling \$1,656,970.

Members

Managers: Jason Knox, Lynnette Fritzke,
Paul Wright
Community Case Manager: Heather Gillett
Inpatient brain injury coordinator: Jill Congram
Physiatrists: Christine McGovern, Rodney Li Pi Shan,
Chantel Debert
Neurologist: Jephtha Davenport
Psychiatrist: Jeremy Quickfall
Clinic Social Workers: Carol Lawson, Valerie Bunz
Neuropsychologists: Stewart Longman,
Amy Siegenthaler
Brain injury clinic secretary: Susan Morson
Brain injury program secretary: Kendra Ness

PM&R Musculoskeletal and Chronic Pain Programs

Program Lead: Dr. Noorshina Virani

Overview

In December 2013, the PM&R MSK Program held its first Western Canadian Performing Arts Medicine (PAM) conference. This was well attended, catering to a multi-disciplinary group of clinicians, artists and educators within the region. We are now pursuing a joint collaboration with Sports Medicine at the University of Alberta, to develop a MSK conference in Calgary for the spring of 2015. This will feature sessions on PAM as part of the larger program.

Members from the Division of PM&R within the DCNS continue to have the opportunity to collaborate with Alberta Ballet on the development and delivery of a multi-faceted clinical and research wellness program for Alberta Ballet's dancers. In addition to ongoing injury screening and supplemental health promotion activities already being delivered, the project team members and Alberta Ballet are helping to coordinate a North American-wide collection of injury data across professional dance companies for the 2014-15 season.

The Division of PM&R MSK program, the AHS Chronic Pain Program and the South Calgary Primary Care Network (SCPCN) are developing an education program to address non-surgical low back pain in the community. Through engagement, we hope to address the needs of family practitioners and patients in diagnosis and management of low back pain. A launch of this Spine Pain Initiative will take place in spring 2015, with a pilot program of patient and physician-focused education modules. Through such knowledge translation we hope to minimize unnecessary referrals to spine surgeons and also the need for advanced diagnostic imaging.

PM&R MSK is engaged in the Alberta Bone and Joint Health Strategic Clinical Network (ABJHSCN). The emphasis is within the Spine Access Alberta and Central Triage PRIHS grants which were awarded earlier this year. The focus is to establish multi-disciplinary spine triage and management clinics in addition to centralized triage access for musculoskeletal services provincially.

Education

In 2013, Physiatry course lectures on Myofascial Pain Syndrome and Musculoskeletal Pelvic Girdle Pain were added to the curriculum for the first time in the history of the University of Calgary Medical School. Training future physicians regarding identification and management of the most commonly overlooked causes of spine and low back pain are the primary objectives.

Members

AHS Chronic Pain Centre (AHS CPC):

Pamela Barton (co-director of CPC quarterly symposia), Nwamara Dike, Noorshina Virani (Neuromusculoskeletal team lead)

Performing Arts Medicine (PAM):

Arun Gupta, Chester Ho, Noorshina Virani, Terry Clark, PhD

Community Practitioners:

Maryana Apel, David Flaschner, Tony Giantomaso, Arun Gupta, Daniel LeBlond, Jordan Raugust, Vishal Tulsi



Pediatric and Young Adult Rehabilitation Medicine

Program Lead: Dr. Lee Burkholder

Overview

The program provides inpatient and outpatient rehabilitation medicine services to various pediatric patient populations including children with brain injury, cerebral palsy, myelomeningocele/spinal cord injury, neuromuscular conditions, limb deficiency and other neurodevelopmental disorders at the Alberta Children's Hospital (ACH). The program is also responsible for the Young Adult Rehabilitation Clinic, an outpatient clinic at the Sheldon M. Chumir Health Centre (SMCHC) dedicated to adult patients with child-onset neurological conditions, which assists patients transitioning from pediatric care to the adult world.

Highlights

Dr. Burkholder is a physician member of the Rehabilitation Working Group and designate member of the Steering Committee of the Vi Riddell Children's Pain and Rehabilitation Centre. Early program development was focused on enhancing services in identified areas of need including transition, driving evaluation and training for youth with disabilities and Allied Health clinical capacity.

Dr. Vithya Gnanakumar became the physician lead for Physical Medicine and Rehabilitation medical student clinical electives in June 2013.

The Young Adult Rehabilitation Clinic successfully relocated from the Foothills Medical Centre to the SMCHC in September 2013 to facilitate interdisciplinary rehabilitation management with Allied Health professionals at the Central Community Accessible Rehabilitation program. Relocation has enhanced goal-directed interdisciplinary management for this patient population, particularly with regard to issues arising from transition to the adult world.

Clinical Care Updates

The Pediatric Rehabilitation Medicine inpatient consultation service assessed and treated 32 patients, within the context of the ACH interdisciplinary neuro-rehabilitation team, while patients were admitted to hospital. An additional 12 patients were followed during admission to the ACH Dr. Gordon Townsend School (GTS) Rehabilitation and Education Program for management of medical and rehabilitation issues.

The program also provided 622 pediatric outpatient consultation and followup appointments through various ACH rehabilitation clinics. A further 255 outpatient appointments were attended by adult patients through the Young Adult Rehabilitation Clinic. The program continued as a significant contributor to the interdisciplinary ACH Spasticity Assessment Program (SAP), which provides consultation to children with complex hypertonicity issues for comprehensive assessment and management recommendations, including invasive interventions such as selective dorsal rhizotomy procedure and intrathecal baclofen pump insertion. The SAP assessed nine children/young adults. Program-led gait analysis for recommendation of therapeutic interventions continued through the C.H. Riddell Movement Assessment Centre at the ACH with 13 patients undergoing evaluation.

Education

Program educational pursuits were largely related to post-graduate medical training. The program had Physical Medicine and Rehabilitation as well as Pediatric Neurology residents on service for 10 of 13 academic blocks. Dr. Gnanakumar is a member of the Physical Medicine and Rehabilitation Residency Training Committee. Dr. Burkholder is a member of the Developmental Pediatrics Residency Training Committee.

Future Direction

Increased clinical capacity at ACH has improved knowledge of Pediatric Rehabilitation Medicine with increased demand for inpatient involvement and outpatient consultation. The program is committed to expansion of the inpatient neurorehabilitation service, the GTS Rehabilitation and Education Program as well as existing neurorehabilitation clinics. The program also intends to introduce a musculoskeletal rehabilitation outpatient clinic in the near future. Additionally, the program will continue to contribute to the development and implementation of expected world-class services and associated research through the Vi Riddell Children's Pain and Rehabilitation Centre.

Members

Dr. Lee Burkholder

Dr. Vithya Gnanakumar

The Spinal Cord Injury Rehabilitation Program

Program Lead: Dr. Chester Ho

Overview

The Spinal Cord Injury (SCI) Rehabilitation Program provides inpatient and outpatient rehabilitation services to persons with traumatic and non-traumatic SCI for southern Alberta, eastern British Columbia and western Saskatchewan. During 2013-14, the SCI Rehabilitation Program focused on the review of the current SCI service delivery across the continuum of care, development of state-of-the-art treatment programs, building education and research capacities, as well as to consolidate collaboration with community partners.

Highlights

- The Calgary Spinal Cord Injury Advisory Committee hosted a two-day Modified Value Stream Mapping (VSM) event at the Dr. Vernon Fanning Centre, with a goal to elucidate the needs of persons with SCI, define the gaps in care provided, and to identify priorities for the development of innovative and integrated SCI care in Calgary and Southern Alberta. This was attended by 36 stakeholders from across the SCI continuum of care.
- As a result of our partnership with the Canadian Paraplegic Association, Allied Health Department at the Foothills Medical Centre, University of Alberta Steadward Centre, University of Calgary Faculty of Kinesiology, Mount Royal University and philanthropic support through Calgary Health Trust, we developed Alberta's first city-wide, "acute rehab to community" Functional Electrical Stimulation (FES) cycling program. FES bicycles are now installed and Phase I of the program has been implemented at FMC and the Canadian Paraplegic Association gymnasium. Pending further funding support, Phase II will include installation of FES bicycles at the University of Calgary Faculty of Kinesiology and Mount Royal University.

Education

- The SCI rehabilitation team has been awarded the Craig Neilsen Foundation Quality of Life grant for "Multi-Modal SCI Patient Education Across the Care Continuum and the Lifespan" (principal applicant: Dr. Ho) to develop an innovative patient-centred SCI education program.
- Multiple team members presented at the Academy of Spinal Cord Injury Professionals annual conference in Las Vegas, NV, in September 2013.
- Dr. Luc Noreau, Professor from Laval University and Director of the Center for Interdisciplinary Research in Rehabilitation and Social Integration in Quebec City, visited the SCI Rehabilitation Program in November 2013, with support by the Canadian Paraplegic Association and Rick Hansen Institute. He presented his findings from the national SCI community survey.

Research

- The SCI rehabilitation program has been funded by the Hotchkiss Brain Institute "University of Calgary Neurorehabilitation" (UCAN) Initiative for assessment of neurorehabilitation outcomes.
- Multiple seed grants have been awarded by the Alberta Paraplegic Foundation to Drs. Ho, Simonett and Jason Knox to study the effects of bone density after SCI, and to develop an Alberta-based SCI Registry.
- Dr. Simonett is the Physiatry lead for the "Study of Human Central Nervous System Stem Cells (HuCNS-SC) in Patients With Thoracic Spinal Cord Injury" trial that was sponsored by StemCells, Inc. (site principal investigator: Dr. Casha). The Foothills Medical Centre is one of only two sites in Canada for this trial.



Certified Nutritional Practitioner Joanne Smith presents at the 2014 Living Well with a Spinal Cord Injury conference in Calgary.

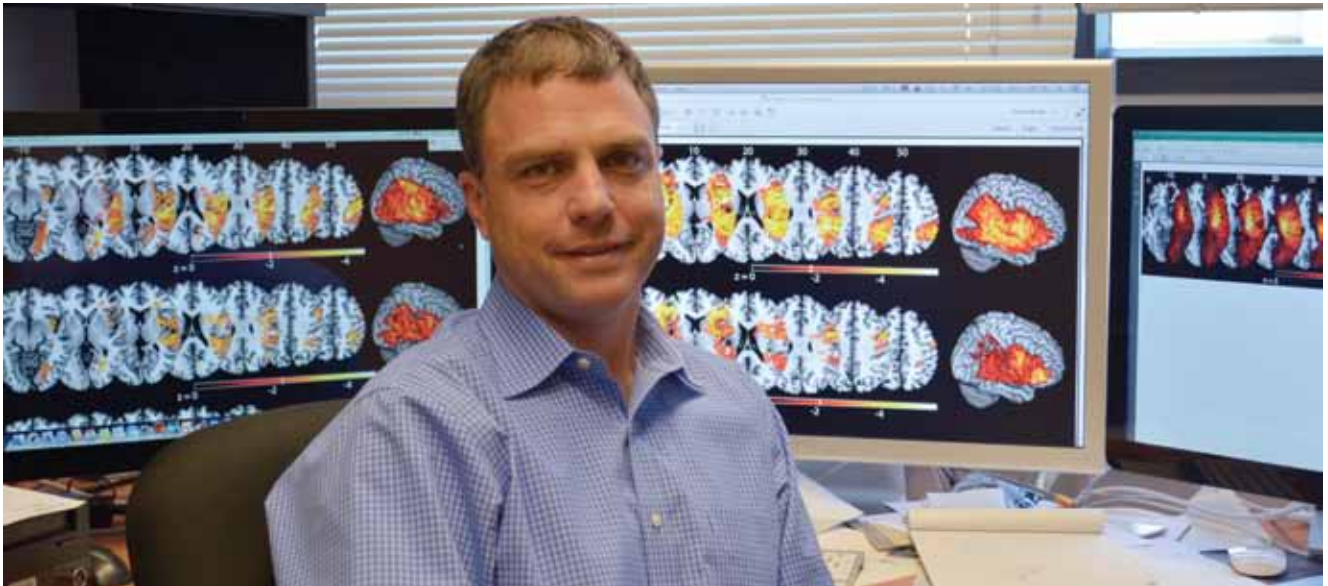
- Dr. Ho has been collaborating with the Rick Hansen Institute as a co-lead for the development of the pressure ulcer module for the Rick Hansen SCI Registry (RHSCIR) 2.0.
- The SCI rehabilitation team continues to be part of the SCI Knowledge Mobilization Network (KMN) to facilitate pressure ulcer prevention best practice implementation at the Foothills Medical Centre.

Members

Denise Hill, MD, FRCP(C)
Chester Ho, MD
Dan McGowan, MD, FRCP(C)
Gillian Simonett, MD, FRCP(C)

The Stroke Rehabilitation Program

Program Lead: Dr. Sean Dukelow



Overview

Physiatry provides support for inpatient stroke rehabilitation services at both the Foothills Medical Centre and the Dr. Vernon Fanning Care Centre. Our physiatry group also supports outpatient stroke rehabilitation in the community through Community Accessible Rehabilitation (CAR), Association for Rehabilitation of the Brain Injured (ARBI), Early Supported Discharge (ESD), and other private rehabilitation facilities. We accept referrals from across southern Alberta for patients who require stroke rehabilitation expertise.

Highlights

Clinical highlights involved two functional electrical stimulation workshops. One workshop was held for therapists in the Calgary Zone and another for therapists working in smaller centres across the province participating in the Cardiovascular and Stroke Strategic Clinical Networks Stroke Action Plan. Workshops were led by Dr. Lam and a team of therapists from across the Calgary zone. These workshops were targeted at integrating functional electrical stimulation into daily rehabilitation practice to promote stroke recovery.

Education

Several physiatry residents, neurology residents, acute stroke Fellows, and medical students spent

time learning about stroke rehabilitation in our clinics, on the ward and in classroom teaching sessions. Dr. McNeil and Dr. Dukelow both spoke at national meetings this past year about stroke rehabilitation related topics.

Research

Members of the Stroke Rehabilitation Program published six papers last year. Further, Dr. Dukelow's lab received CIHR funding for continuation of the RESTART study which investigates the use of robotic assessment tools for individuals with stroke.

Participation continued as a site in the Heart and Stroke Foundation of Ontario funded multi-centre EVREST trial examining the efficacy of virtual rehabilitation using the Nintendo Wii for the upper extremity. Further, the groundwork was laid to begin a multi-centred study, DOSE, funded by the Partnership for Stroke Recovery which investigates the role of high intensity aerobic exercise in recovery following stroke.

Members

Dr. Sean Dukelow
Dr. Ken Lam
Dr. Steve McNeil
Dr. Gentson Leung

General Physical Medicine and Rehabilitation

Overview

General Physical Medicine and Rehabilitation (PM&R) patients are seen in the Outpatient Physiatry clinic area on the main floor of the Special Services building at Foothills Medical Centre. Various Physiatrists and Senior Physiatry residents provide consultation and physician followup services to these patients.

In the period of June 2013 to June 2014 a total of 209 new general physiatry outpatients and 511 repeat visits occurred in the Physiatry clinic area at Foothills. A second outpatient site for General PM&R consults just opened this year at Rockyview General Hospital with Dr. Gentson Leung, one of our new staff and recent graduates from the University of Calgary program.

General PM&R is not a formal multidisciplinary program at this time. The types of patients seen may include adults with non-surgical rehabilitation needs secondary to inflammatory and degenerative arthritis, scoliosis, myofascial pain, spine and peripheral joint pain, orthopedic trauma, tendinopathy, metabolic bone disease, neuromuscular disease, cerebral palsy, neurological and musculoskeletal complications of HIV or cancer, and some movement disorders.

Three physiatrists continue to provide outpatient consultation service to the subspecialty Neuromuscular, Amyotrophic Lateral Sclerosis, and Multiple Sclerosis multidisciplinary clinics at the South Health Campus, as well as some Inpatient General Physiatry consultations provided mainly by Dr. Dan McGowan.

Inpatient General Physiatry consultation is provided at Rockyview General Hospital and Carewest Glenmore Park on a weekly basis by Dr. Gentson Leung. At the Foothills Medical Centre, Inpatient General Neurological rehabilitation consultation is currently provided by a rotating Physiatrist on service for patient populations including but not limited to multiple sclerosis, neuromuscular disease, cerebral palsy, and some cancer patients, as well as subspecialty Physiatry spasticity inpatient consultations. There were a total of 127 Inpatient General PM&R and Neurological consultations from all four acute care sites, including Peter Lougheed Centre, and Carewest Glenmore Park.

Some of the Physiatrists in the General Physiatry clinics continue to develop expertise in the use of ultrasound for visualization of nerve and musculoskeletal structures, and for guided injections. This innovative technology is rapidly moving to the forefront in Physiatry education and clinical practice, especially in the areas of musculoskeletal medicine, neuromuscular disease and spasticity management. Further research is very much needed in these areas to define its most appropriate and optimal use.

The Division of Translational Neuroscience

Dr. V. Wee Yong

THE DIVISION OF TRANSLATIONAL NEUROSCIENCE

(DTN) in the Department of Clinical Neurosciences (DCNS) consists of five primary members distinguished by their PhD background. Research areas include neurodegenerative diseases, movement disorders and multiple sclerosis, and the focus has been understanding the pathogenesis of neurological disorders and the discovery and translation of new therapies into the clinic.

All members within DTN maintain meaningful and productive collaborations with clinicians or clinician scientists within the DCNS, in addition to our partners in the Hotchkiss Brain Institute (HBI), the University of Calgary and Alberta Health Services.

Current active members of DTN include:

- **Dr. V. Wee Yong** is a professor whose laboratory is based at the HBI. He co-directs the Multiple Sclerosis (MS) Program of HBI, he holds the Canada Research Chair in Neuroimmunology and he is the President of the International Society of Neuroimmunology. Dr. Yong's research interests lie in the area of neuroimmunology, neuroprotection and CNS regeneration. His projects have been guided by MS, spinal cord injury and malignant gliomas. Dr. Yong's research has been translated into clinical trials in MS and spinal cord injury. His research has been supported by Canadian Institutes for Health Research (CIHR), the Multiple Sclerosis Society of Canada, and Alberta Innovates - Health Solutions (AIHS).
- **Dr. Minh Dang Nguyen** is an associate professor and a member of the HBI. The main goal of his research is to understand the roles of the cytoskeleton, the physical backbone that maintains the architecture of the cell, in neurological diseases. His research has been funded by AIHS, Alberta Cancer Foundation, CIHR, the Human Frontier Science Program Organization, the Brenda Strafford Foundation Chair in Alzheimer research, the Amyotrophic Lateral Sclerosis and the Austrian Academy of Sciences.
- **Dr. Shalina Ousman** is an assistant professor and a member of the MS Program of HBI. Her research is focused on investigating the role of alphaB-crystallin (α BC) in autoimmune function, disease mechanism and regeneration in the context of multiple sclerosis. Her research has been funded by CIHR, AIHS, Multiple Sclerosis Society of Canada and Canadian Foundation for Innovation.



- **Dr. Bin Hu** is a professor for Parkinson's disease research and a member of HBI. He currently directs a basic research laboratory and an experimental therapeutic program for patients living with Parkinson's disease. His scholarly activities and research interests are focused on brain attention networks, especially those related to sensorimotor learning and memory. His research has been supported by CIHR, Parkinson Society Alberta, AHS and Branch-out Foundation for Neurological Diseases.
- **Dr. Oury Monchi**, Professor, joined DCNS as Clinical Research Director, and the Department, HBI and the Cumming School of Medicine as the Research Director of the Movement Disorders Program, and the Tourmaline Oil Chair in Parkinson's disease. He was, until September 2014, the founding director of the Quebec Parkinson Network. His laboratory has been a pioneer in using different neuroimaging techniques to study the origins and evolution of cognitive deficits in Parkinson's disease with the ultimate goal of the early prediction of dementia in the disease. Interactions between cognitive and neuropsychiatric symptoms are also being studied. Non-medication therapies such as transcranial magnetic stimulation and cognitive training are also being explored. His research is funded by CIHR, NSERC, and Parkinson Society Canada.
- Dr. Ousman published a review article in the high impact journal Nature Neuroscience titled, Immune Surveillance in the Central Nervous System.
- Dr. Hu was awarded \$750,000 to start a multi-centre study of Ambuloso, a sensorimotor contingency-based music walking program for people living with Parkinson's disease.
- Dr. Monchi sits on the Behavioural Science B panel at CIHR. In 2014, his laboratory published in the journal Brain the first longitudinal study showing in vivo with anatomical MRI that the early presence of Mild Cognitive Impairment in Parkinson's disease is associated with a faster neurodegenerative process than in cognitively healthy PD patients.

Education

DTN members offer graduate, postdoctoral and clinical fellowship studies in both clinical and basic neurosciences, year-round research projects for senior undergraduates and summer research programs. Division members are also active participants in community-oriented educational events.

Research

Members from DTN received more than \$2.2 million in research and grant support for 2014. See the back of this annual report for a detailed publication list.

Future Directions

The division of Translational Neuroscience is in a unique position to foster cutting edge translational neuroscience research. We are somewhat different from the basic science departments in that our program has a clear mandate to facilitate and integrate research and education and to ensure that discoveries in basic and clinical research can lead to innovative health solutions for Canadians who suffer from neurological and mental disorders.

Highlights

- Dr. Yong was elected a Fellow of the Royal Society of Canada. He was inducted into the Order of the University of Calgary for his contributions to research, academia and university community. Dr. Yong's laboratory published a key paper in Nature Neuroscience that highlights the potential of translating new therapies for brain tumours.
- Dr. Minh Dang Nguyen sits on the Systems Neuroscience A grant panel at CIHR. Recently, he has been invited to sit on the Molecular and Cellular Neurosciences B grant panel and to participate as a Reviewer to the First Foundation Scheme Live Pilot from CIHR.

Researcher goes Down Under to collaborate on gait freeze trial

**This collaboration
... will scientifically
enhance the
relationship and
exchange between
the Florey
Institute and HBI.**
— Dr. Bin Hu

MOTOR SKILL DEFICITS—especially problems with walking—are, sadly, common in patients with Parkinson’s disease.

A deficiency of dopamine in the basal ganglia can lead to falls and “freezing,” which is referred to as gait freezing. It can temporarily leave patients unable to move and feeling like their feet have become stuck to the floor.

The condition was top of Dr. Bin Hu’s mind as he headed to Melbourne, Australia earlier this year for an international exchange, supported by the Rebecca Hotchkiss International Scholar Exchange (RHISE) program of HBI, at St. Vincent Hospital and Florey Neuroscience Institute.

“This subject is of important clinical relevance and important to patients,” says Dr. Hu. “It’s also scientifically fascinating.”

The trip, which was part of Dr. Hu’s sabbatical leave, saw him collaborating with Parkinson’s disease researcher Dr. Malcolm Horne, who heads the institute’s Movement Disorder Clinic.

While in Australia, the duo ran a pilot study which recruited 12 patients who were followed over two months as they used an electronic monitoring device called a Parkinson’s KinetiGraph™ (PKG) and employed AmbuloSono, a music walking program.

“I met Dr. Horne at a movement disorder society annual meeting and I sensed there was a high degree of synergy between the two technologies.”

While many patients in the initial trial weren’t able to complete the PKG portion of the trial due to advanced disease symptoms, there was encouraging data from the AmbuloSono component.

After six weeks of study, three of the remaining four freezing patients showed marked improvement in gait freezing and one showed substantial reduction of falls from more than 10 times a week to zero.

“The staff members and myself—as well as the patient and her spouse—were all very happy,” says Hu.



Dr. Bin Hu, left, with Dr. Malcolm Horne in Melbourne, Australia.

As a result, a second trial was quickly organized and received ethics approval shortly after Dr. Hu returned to Calgary.

“Dr. Horne has informed me that the spouse of the first patient, who has completed three weeks training, reported substantial reduction of freezing and falls,” says Dr. Hu.

In addition to the gait research, Dr. Hu’s says his visit has resulted in valuable connections between Melbourne and Calgary.

This fall, Dr. Horne visited Calgary to present at DCNS Grand Rounds and also delivered the keynote lecture at the second annual Parkinson’s symposium at the University of Calgary.

“This collaboration will allow us to move quickly to a larger, international clinical trial,” he says. “And it will scientifically enhance the relationship and exchange between the Florey Institute and HBI.”



Undergraduate Medical Education in Clinical Neurosciences

Co-Chairs: Drs. Gary Klein and Darren Burback

Evaluation Co-ordinator: Dr. David Patry

Anatomy Co-ordinator: Heather Jamniczky PhD

Course Co-ordinator: Sue-Ann Facchini

Overview

Medical students are taught about the neurosciences and aging in the first course of the second year of the undergraduate curriculum during August and September each year. The neurosciences component is combined with content from geriatrics, otolaryngology and ophthalmology. The course, entitled, Course V – Neurosciences, Aging and Special Senses, is overseen by the Undergraduate Medical Education office of the Cumming School of Medicine at the University of Calgary.

The neurosciences content in the course begins with a series of lectures on the functional anatomy and physiology required to evaluate patients presenting with neurological complaints. The remainder of the content covers clinical presentations of neurological illness as well

as sessions devoted to specific neurological conditions. The curriculum is taught by approximately 130 teachers, including 60 from the Department of Clinical Neurosciences.

Course content is delivered via a combination of lectures, patient presentations, small group seminars and bedside teaching sessions. A group of approximately 15 teachers from the department have taken some further faculty development training and have committed to supervising many of the small group and clinical teaching sessions.

Course V Committee:

Paolo Federico, Dan McGowan, Clare Gallagher, Alice Ho, Lothar Resch, Karen Fruetel, Paula Pearce, Karin Verstraten, Vivian Hill, Paul Marck, Patrick Lee, Sue-Ann Facchini, Alby Richard, Carolyn Wong-Ranasinghe, Heather Jamniczky

Resident Profiles

Physical Medicine and Rehabilitation

Dr. Vishal Tulsi has an undergraduate degree in business and biology from the University of Calgary. He moved east to Queen's University to complete his training in medicine and returned to Calgary in 2009 to complete his residency in psychiatry.

"I was originally from Calgary, so I wanted to come back here. It's a great city and I knew DCNS had a dynamic psychiatry division," he says.

Dr. Tulsi is currently doing outpatient musculoskeletal medicine and electrodiagnostics. He has recently completed research on health economics and the cost of stroke rehabilitation in Calgary.

"We completed a cost analysis on the four stroke programs in Calgary and it was interesting



Dr. Vishal Tulsi

to see how the programs were charged out at each of the centres," says Dr. Tulsi. As a result of the project, he helped to improve overall costing protocol in order to make it more consistent across the four stroke programs.

Dr. Tulsi was recently responsible for helping to enhance patient care in Unit 58 by improving the patient information communicated between the day and night time staff on call.

"We have improved the protocol and staff hand over is now much better," he says.

Dr. Tulsi has also been on the Stroke Planning Committee and the Continuing Medical Education committee. He was recognized by The Calgary and Area Medical Staff Society (CAMSS) for exceptional leadership during the core years of his residency with a scholarship grant.

Dr. Tulsi has started his practice with colleague Dr. Jordan Raugust and is interested in planning educational events for residents and medical students.

Neurology

Neurology resident Dr. Aravind Ganesh has been awarded a prestigious Rhodes Scholarship and he will spend two years studying at Oxford University.

"For me, the biggest excitement is having the opportunity to network with like-minded people within the Oxford and Rhodes communities who are also trying to find sustainable solutions to the problems we are facing related to gaps in care," he says.

"It will be really nice to bounce ideas around with scholars from these other communities and to collaborate long term."



Dr. Aravind Ganesh

His current research is focused on how to prevent stroke, the complications of stroke, as well as ongoing research into vascular dementia. As part of his stroke prevention research, he has worked with rural populations and women who are at a higher risk of stroke following pregnancy.

He says he wouldn't have been able to receive the scholarship without the support of the neurology residency training program at DCNS.

"The support, encouragement and advice people receive here really encourages them to reach their full potential."

Resident Profile

Neurosurgery

Resident focused on inflammation and the science of concussion

FIFTH YEAR NEUROSURGERY

resident Dr. Rita Nguyen has been exposed to the gamut of neurosurgical problems. One recurring problem has kept Dr. Nguyen awake through many nights on call—traumatic brain injury.

Traumatic brain injury (TBI), which is the leading cause of death and disability in young adults, has two phases: the primary injury that occurs at the time of impact, and the secondary, delayed response that can occur days to weeks after the initial injury—driven by inflammation and activation of the immune system.

Recently, concern has been raised about the potential long-term effects of repeated TBI/concussion, particularly in those most at risk: young athletes and those engaged in professions associated with frequent head injury. Current tests cannot reliably identify concussions, and there is no way to predict who will recover quickly, who will suffer long-term symptoms, and which individuals will develop progressive brain degeneration or chronic traumatic encephalopathy.

Dr. Nguyen quickly realized that the clinical tools for identifying and understanding TBI remain crude and better ones must be available. Furthermore, she realized that treatment options for managing both the primary

injury and the secondary injury remain limited. When treating patients with concussions, Dr. Nguyen has inevitably been asked, when is the patient allowed to resume normal activity? The challenge, she says, is that concussion can't be seen on a CT scan.

"We tell patients that when they feel better they can go back to work or play, and there are guidelines to help us give a timeframe," she says. But Dr. Nguyen says what is worrisome is that "we don't actually know what's happening on a cellular level" at any time following TBI.

That uncertainty drove Dr. Nguyen to take a break from her residency training in order to pursue research about brain inflammation following TBI in order to find better ways to understand and diagnose concussion. She joined the laboratory of Dr. Paul Kubes in the Snyder Institute for Chronic Diseases at University of Calgary.

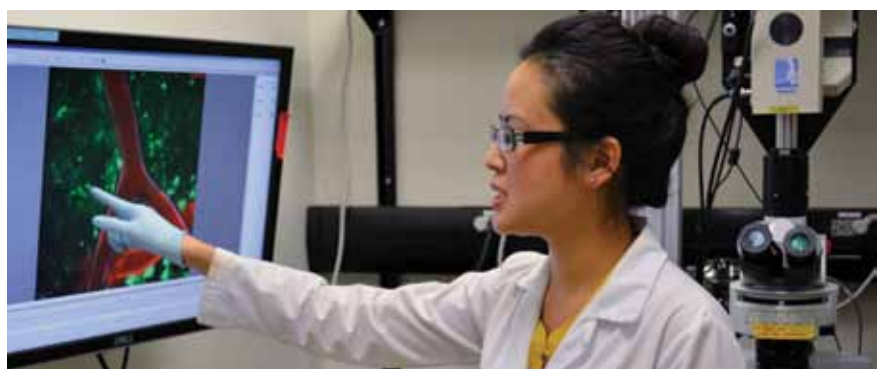
Under the guidance of Dr. Kubes, a world leader in the field of inflammation and advanced

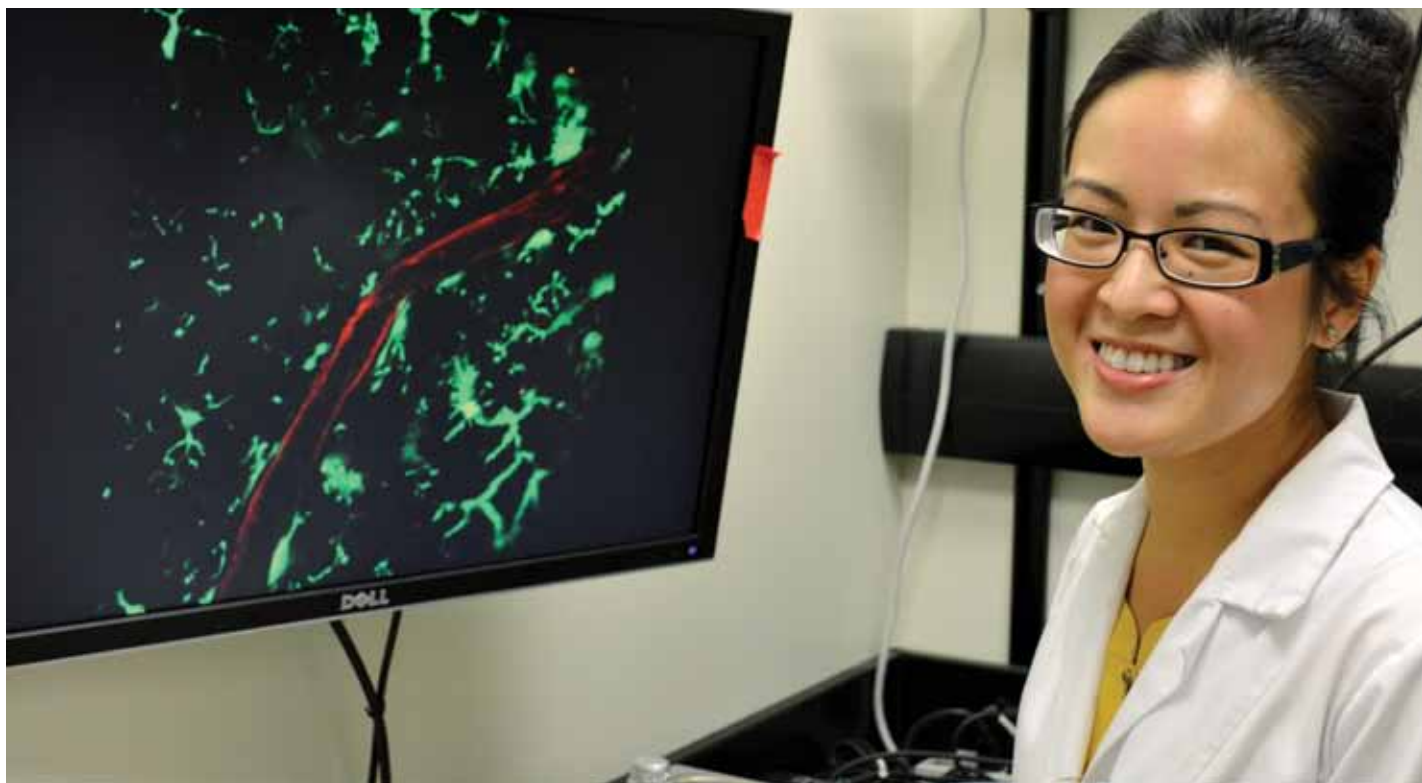
imaging of inflammation, she began to investigate the sequelae of single and multiple brain injuries. Dr. Nguyen is using an animal model to interrogate the inflammatory response following traumatic brain injury at the cellular and molecular level.

"I'm currently working on characterizing the inflammatory response following TBI, identifying which cells respond first and the time course of the inflammatory reaction".

Measuring brain inflammation involves looking at cells called microglia, the innate immune cells of the brain that are always sensing for brain injury or infection. Normally microglia are protective, but microglia can also be detrimental, "if they are over-stimulated, they actually cause harmful inflammation," says Dr. Nguyen.

She has already discovered that peak inflammation occurs between six and 12 hours after injury, then starts to resolve by 24 to 48 hours. However, when a second hit is delivered at 24 hours, the response is markedly





Dr. Rita Nguyen's research lab is studying the effects of concussion at the cellular level.

different. Dr. Nguyen found that a second concussion results in a doubling of the number of activated microglia at the site of injury and prolonged duration of inflammation. "It is very exciting to see this occurring in front of your eyes and to see the magnitude of the second response. This is similar to what we see clinically with the second impact syndrome in children and young adults."

Although it's extending her six-year residency training, Dr. Nguyen is determined to complete her research and find a way to translate her scientific discoveries to the clinic.

"Most scientists never see the patient and most clinicians never see the science," she says.

"It's a great opportunity for me because it allows me to take important questions I have when seeing patients and explore them scientifically. We can manipulate the conditions in research in ways that we can't in patients."

Her research has important implications for patients with concussions or TBIs.

"As clinicians, we basically go on symptoms," she says. "However, when a person is feeling better, does that mean the inflammation is gone? We don't know. We can't see it."

Dr. Nguyen hopes that by defining the inflammatory process that occurs following TBI she will be able to find a reliable way to identify concussion.

She is convinced the new approach will result in more translatable science than previous research and is hopeful her discoveries will ultimately lead to novel approaches to managing and treating TBI, especially mild cases.

Until that's done, you'll find Dr. Nguyen at her microscope.

"I don't want to leave questions unanswered."

Neurology Residency Program

Program Director: Dr. Michael Yeung

Program Administrator: Elizabeth Martens

Number of positions per year: 3

Accreditation: Royal College of Physicians and Surgeons of Canada

Length of Training: 5 years

Mandatory Research Block: 3-6 months

The University of Calgary Adult Neurology Residency Training Program is dedicated to educating residents in Neurology. Upon completion of training in Neurology, a resident is expected to be an expert in the prevention, diagnosis, and management of patients with diseases of the nervous system; and to integrate all of the CanMEDS roles (Medical Expert, Communicator, Collaborator, Manager, Health Advocate, Scholar, and Professional) to provide optimal, ethical and patient-centred medical care.



Dr. Michael Yeung

The program facilitates learning through an atmosphere of collegiality and mutual respect that fosters active communication between residents and faculty.

We emphasize the pursuit of excellence in clinical and academic neurology and instill intellectual curiosity of the discipline for the academic leaders of tomorrow.

We strive to create a level of excitement that will stimulate our residents to seek further education and pursue careers in academic and community neurology. Our program aims to serve both the present and future requirements of our patients, communities, and discipline.

Our residents have presented their research at national and international conferences and have been the recipients of grants and scholarships for their clinical and academic pursuits.

Dr. Aravind Ganesh is embarking on his tenure as a Rhodes Scholar at the University of Oxford in England pursuing his interests in global health and stroke. Dr. Tyson Brust was awarded an Education Research Grant by the American Academy of Neurology (AAN) for his research project on podcasting. Drs. Daryl Wile and Seraj Makkawi were awarded Resident Scholarships to the AAN's Annual Meeting. Dr. Wile also received the Parkinson Society of Canada Clinical Movement Disorders Fellowship which he is pursuing at the University of British Columbia. Dr. Janka Hegedus won a Commendation for Clinical Research at the 24th International ALS/MND Meeting in Milan, Italy; she was also awarded the Best Clinical Research Project at the DCNS Resident Research Day. Several residents have been honoured as the Resident of the Month by the Professional Association of Resident Physicians of Alberta (PARA) – Drs. Harinder Dhaliwal, Daryl Wile, and Christopher Hahn.

The Neurology Residency Training Program at the University of Calgary prepares residents to become specialists in neurology, whether their primary interest is in clinical or academic neurology. The program has trained over 35 neurologists since its inception in 1981; these specialists practice neurology in community and academic institutions throughout the world.

Neurosurgery Residency Program

Program Director: Dr. R. John Hurlbert

Program Administrator: Patti Sullivan

Number positions per year: 2

Accreditation: Royal College of Physicians and Surgeons of Canada

Length of Training: 6 years

Mandatory Research Block: 1 year

Education of our postgraduate and undergraduate students remains one of the highest priorities of DCNS and the Division of Neurosurgery. The teaching faculty consists of a large complement of dynamic key opinion leaders representing all subspecialties of neurosurgery including vascular, interventional, glioma, skull base, epilepsy, function and peripheral nerve interests. In addition, the University of Calgary boasts the largest comprehensive spinal surgery program in Canada with a total of 11 full-time spine surgeons coming from both neurosurgical and orthopedic backgrounds.



Dr. R. John Hurlbert

From the moment residents enter the program, they are continuously involved in research and education initiatives. Considerable resources are dedicated each year to facilitating this academic activity through faculty participation, existing peer-reviewed grants, project funding from divisional and department sources and 12 months of mandatory clinical or basic science research. The neurosurgery school runs each week for two

hours on Monday afternoons. Sessions are led by the residents and supervised by the faculty, creating a learning environment within the realm of neurosurgical expertise.

A number of our residents have been the recipients of various awards for their outstanding clinical and academic endeavors. Dr. Fady Girgis was awarded the MacKenzie Prize for Basic Science at the 2013 Annual Canadian Neurological Sciences Federation meeting. Dr. Joey Grochmal was selected by the attending teaching faculty for this year's resident basic science presentation award at the annual Alberta Neurosurgical Society meeting. Dr. Roberto Diaz was awarded the Doug Zochodne plaque for the best basic science presentation at the 2013 DCNS Research Day. Dr. Tso is in the second year of his Vanier Graduate Scholarship.

Team relationships outside the hospital are of equal importance to the Division of Neurosurgery as they are within the hospital. The program offers a well-rounded exposure to all aspects of neurosurgery within a close and collegial environment. Non work-related, team building events held throughout the year provide a health balance against a busy lifestyle choice. The end result is a recipe for one of the most cohesive, dedicated, and high-performing resident groups in all of Canada and a group that we are proud to call our own.

Physical Medicine and Rehabilitation (PM&R) Residency Program

Program Director: Dr. Stephanie Plamondon

Program Administrator: Linda Jennett

Number of positions per year: 2

Accreditation: Royal College of Physicians and Surgeons of Canada

Length of Training: 5 years

The Division of Physiatry provides teaching for undergraduate and post-graduate education.

Within the last academic year the division supported 11 post-graduate Residents in its Royal College accredited Physical Medicine and Rehabilitation training program. In addition, there were 13 off-service and visiting residents for a total of 15 rehabilitation block rotations for neurology, pediatric neurology, geriatrics, family medicine (Sports), rheumatology and out of province elective PM&R residents.

There are close to 30 formal electives for medical students, several Meds 440 courses and approximately 10 shadowing students. The demand for Physiatry electives and shadowing opportunities has been growing rapidly over the last few years and is keeping pace with the PM&R staff growth. The Division of Physiatry provides support to the medical school in Course 1 (MSK) and Course 5 (Neuro) teaching for small groups, lectures, and clinical skills.

The Senior Physiatry Resident clinic occurs one half day per week and provides service to General Physiatry patients (ie. non sub-specialty Physiatry



Dr. Stephanie Plamondon

patients). Two Physical Medicine and Rehabilitation residents provide outpatient consultation and followup in this longitudinal clinic while supervised by a staff physiatrist throughout their final year of training. This allows further outpatient clinic exposure, experience in continuity of care, development of managerial and time management skills, opportunity for OSCE examination preparation, teaching medical elective students, and exposure to varied clinical diagnoses that may not be typically seen in the subspecialty clinics and inpatient services.

Since our residency training program's inception in 2004, all of our 11 graduating University of Calgary PM&R residents have successfully passed both their Royal College Certification examinations and their EMG (CSCN) examinations (100% pass rate). They have also all successfully started their careers in either tertiary centres, mid-size or large community-based practices. Their varied career paths have included some choosing extra subspecialty fellowship training, significant protected research and clinical combinations, teaching and faculty development involvement and those choosing full-time clinical practice.

Two of our current PM&R residents have received awards within the last year and one received an honorable mention at the annual DCNS Resident research day (**Dr. Janet Tapper**, PGY-3).

Dr. Vishal Tulsi, PGY-5, received a Foothills Medical Staff Association Resident Scholarship award



Physical Medicine and Rehabilitation Program Residents prepare for an ALS Bucket Challenge.

for residents who have demonstrated exemplary leadership skills during their training.

Dr. Jordan Raugust, PGY-5, received the American Academy of Physical Medicine and Rehabilitation President's Citation Award (2013) for "The influence of diagnostic terminology on parents' perception of severity following pediatric mild traumatic brain injury or concussion."

Dr. Raugust's other awards include:

Alberta Provincial Physical Medicine and Rehabilitation Residents' Research Day, Best Completed Research Project (2013). "Concussion in pediatric ice hockey: what we can learn from demographics"

American Academy of Physical Medicine and Rehabilitation Best Neurological Rehabilitation Research Podium Presentations Selection (2013). "The influence of diagnostic terminology on parents' perception of severity following pediatric mild traumatic brain injury or concussion"

Canadian Association of Physical Medicine and Rehabilitation Best Clinical Research Poster Presentation - Second Prize (2013). "Concussion in pediatric ice hockey players: description of characteristics based on a previous history of a concussion or mild traumatic brain injury"

American Medical Society for Sports Medicine, Best Case Presentation (2013). "Return-to-Play Considerations in an Adolescent After Spinal Trauma"

Fellowships in Clinical Neurosciences

Overview

The Department of Clinical Neurosciences (DCNS) at the University of Calgary offers one and two year basic and clinical research fellowships designed to provide enhanced broad-based clinical training and responsibility beyond the certification level, as well as clinical research opportunities. DCNS has an average of 30 Fellows each year studying in a variety of specialties.

Individual Fellows work on specific projects targeted to clinical neurosciences problems in a variety of areas including:

- Stroke
- Spinal Neurosurgery
- Peripheral Nerve
- Functional Neurosurgery
- Stereotactic and Functional Neurosurgery
- Neuro-oncology
- Endovascular Neurosurgery
- Epilepsy
- Headache
- Multiple Sclerosis
- Neuromuscular

Within the University of Calgary and Alberta Health Services, the structure of DCNS is uniquely suited to advancing research from the laboratory directly to the patient's bedside. The department has been fortunate to attract Fellows from a wide variety of backgrounds seeking further subspecialty experience. Their presence has enriched the clinical and academic environment for all.

For more information on fellowship opportunities, please contact us at www.ucalgary.ca/DCNS/education/fellowship-program

Research in Clinical Neurosciences

Overview

The Department of Clinical Neurosciences (DCNS) was founded over 30 years ago on the premise that excellence in patient care and excellence in research go hand in hand. We see them not only as inseparable, but synergistic.

Many of the physicians and surgeons in Clinical Neurosciences are actively engaged in research, however some focus exclusively in patient care. The spirit of research and innovation are integral to our team and are continuously fostered. Members of our department lead a variety of research programs and our research is facilitated by strong partnerships with: the Hotchkiss Brain Institute (HBI), clinical departments within the Calgary Zone of Alberta Health Services as well as other public and private organizations. Our members' research efforts focus on the following areas:

- **Basic Research:** The study of biology and mechanisms of disease.
- **Translational Research:** Which involves taking findings from basic research and moving them quickly and efficiently into medical practice to improve disease treatment or other health outcomes.
- **Clinical Trials Research:** The comparative testing of new treatment ideas against current standards of care to determine which is superior.
- **Health Services Research:** The study of health care access and health care delivery to detect deficiencies and design improvements. Health services research often involves careful analysis of databases.
- **Population Health Research:** The study of disease in populations to find risk factors and design prevention methods.

This year our annual report highlights a number of research initiatives including:

- **Dr. Karen Barlow** and **Dr. Michael Esser** at Alberta Children's Hospital are combining clinical practice and translational science to help tackle traumatic brain injury questions that would be difficult for each to address on their own.

- Assistant Professor Of Neurology **Dr. Bijoy Menon** is using innovative imaging techniques to improve stroke outcomes for patients.
- **Dr. Alim Mitha** and his team are manufacturing stents and culturing stem cells and endothelial cells to treat brain aneurysms.
- **Dr. Bin Hu** took his gait-freezing research to Australia for a collaborative trial of music therapy in Parkinson's disease patients.
- Neurosurgery resident **Dr. Rita Nguyen** is taking her clinical experience back to the lab to study the inflammation process and learn how the brain responds to concussion—especially in those with multiple injuries.

Our research-focused doctors and scientists are also members of the Cumming School of Medicine, Alberta Health Services (AHS) and the Hotchkiss Brain Institute from which they receive invaluable assistance, mentorship and support. Indeed, much of our success in research as a clinical group can be traced to these very strong linkages.

Our faculty members publish the results of their studies in the top medical and scientific journals and they play leading roles in a wide variety of local, national, and international academic and professional organizations. Their efforts are generously supported by grants from a wide range of external agencies.

In the subsequent pages of this Report, we are pleased to provide details of the publication and funding accomplishments in the past year by our Department members.

Grants

Neurology

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Barber, Philip A.	Imaging Biomarker Diagnosis of Cognitive Impairment in Mild Stroke and TIA	Katthy Taylor Vascular Dementia Research Chair	\$15,000
Barber, Philip A.	Acute Quantitated T1 and T2 MRI of Intra Thrombolysis Reperfusion-related Injury Following Stroke (AGUT)	Department of Clinical Neurosciences / Stroke Program	\$50,000
Barber, Philip A.	Recanalization following Endovascular treatment and imaging of Perfusion, Regional Infarction and atrophy to Understand Stroke Evolution (REPERFUSE)	Heart & Stroke Foundation of Canada	\$197,505
Barber, Philip A.	Vascular Team of Canadian Consortium on Neurodegeneration in Aging (CCNA) Team 7: Vascular aspects of neurodegeneration	Canadian Institutes for Health Research	\$750,000
Becker, Werner J.	A phase 2 randomized double-blind placebo-controlled study to evaluate the efficacy and safety of AMG 334 in chronic migraine prevention	Amgen Canada Inc	\$83,058
Becker, Werner J.	An open label extension study to assess the long term safety and efficacy of AMG 334	Amgen Canada Inc	\$62,364
Becker, Werner J.	Changes in intracranial compliance in migraine subjects following a National Upper Cervical Chiropractic Association (NUCCA) atlas correction intervention	Tao Foundation, Hecht Foundation, Upper Cervical Research foundation, and Ralph R Gregory Memorial foundations (Canada)	\$160,000
Becker, Werner J.	Evaluation of an aerobic exercise program in migraine management	Division Of Neurology ARP Research Grants	\$60,000
Becker, Werner J.	Frovatriptan as a Transitional Therapy in Medication Overuse Headache	No specific funding source	\$80,000
Becker, Werner J.	Percutaneous closure of Patent Foramen Ovale in Migraine with Aura - a Randomized Prospective Study	St. Jude Medical	\$40,000
Brownell, A. Keith W.	Best Ethical Practices in Managing Uncertainty in Medical Diagnosis: an Investigation of Ethical Principles Applied to Decision-Making Catalyst Grant: Ethics \$50,000 (1st Year)	Canadian Institutes for Health Research	\$50,000
Burton, Jodie	The influence of menstrual history on multiple sclerosis	endMS/MS Society of Canada	\$13,500

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Cairncross, J. Gregory	Alberta Cancer Foundation Chair in Brain Tumour Research	Philanthropy	\$165,000
Cairncross, J. Gregory	EGFR and PTEN mutations in GBM tumourigenicity	Alberta Innovates - Health Solutions (AIHS)	\$450,000
Cairncross, J. Gregory	Therapeutic Targeting of GBM	Terry Fox Foundation & Research Institute, Alberta Cancer Foundation, Alberta Innovates Health Solutions, Genome Canada	\$8,180,000
Cairncross, J. Gregory	Therapeutic Targeting of STAT3 in GBM	Alberta Cancer Foundation	\$750,000
Cooke, Lara J.	Assessment and Treatment of Aggression in Children with Disruptive Behaviour Disorders: Development of an educational curriculum for residency education and an eCME program for practicing physicians	Canadian Institutes for Health Research	\$24,891
Cooke, Lara J.	Can Neurology Residents' Empathy be Enhanced?	American Academy of Neurology	\$9,800
Cooke, Lara J.	Clinical Queries, Prescribing Practices Clinical Queries, Diagnostic Imaging Clinical Queries, Laboratory Data	Alberta Medical Association, Alberta Health	\$1,700,000
Cooke, Lara J.	Completing a quality ITER: Can we influence the demonstrated skills of clinical supervisors?	Academy for Innovation in Medical Education	\$21,875
Cooke, Lara J.	Improving appropriate care for those with epilepsy-Knowledge Translation of the CASES clinical support decision support tool	Canadian Institutes for Health Research	\$90,000
Costello, Fiona	A multi-centre collaborative study on the clinical features, expression profiling and quality of life in pediatric fascioscapulohumeral	US FSH-Society and Muscular Dystrophy Canada	\$96,600
Costello, Fiona	Investigating mechanisms of axonal degeneration in multiple sclerosis	National MS Society	\$1,124,000
Costello, Fiona	The clinical-demographic epidemiology, pathobiology, neuroimaging features and outcome of acute demyelination in Canadian children	Multiple Sclerosis Society of Canada	\$3,273,467
Costello, Fiona	The Influence of Hormonal Contraceptive Use and Reproductive Hormone Levels on Optic Neuritis in Women	University Research Grants Committee (URGC)	\$16,091

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Costello, Fiona	Use of optical coherence tomography (OCT) in the study of Parkinson's disease and other parkinsonian syndromes	Hotchkiss Brain Institute - private donor	\$80,000
Coutts, Shelagh B.	Alberta Stroke Prevention in TIAs and mild strokes (ASPIRE)	Heart & Stroke Foundation of Canada	\$600,000
Coutts, Shelagh B.	CT And MRI in the Triage of TIA and minor Cerebrovascular events to identify High risk patients (CATCH)	Pfizer Cardiovascular research award	\$200,000
Coutts, Shelagh B.	Diagnosis Of Uncertain-origin Benign Transient neurological symptoms (DOUBT)	Canadian Institutes of Health Research	\$594,855
Coutts, Shelagh B.	Extended CATCH		\$200,000
Coutts, Shelagh B.	Reducing Stroke burden with hospital-ready biomarker test for rapid TIA triage	Genome Canada	\$4,878,969
Coutts, Shelagh B.	The Neurological Disease and Depression Study (NEEDS) – addressing the burden, course and impact of depressive disorders in neurological conditions	Alberta Health	\$450,000
Coutts, Shelagh B.	Thrombolysis for Minor Ischemic Stroke with Proven Acute Symptomatic Occlusion Using TNK-tPA (TEMPO-1)	Internal funding	\$200,000
Demchuk, Andrew	DIAS4 - a randomized, double-blind, parallel-group placebo-controlled phase III study to evaluate the efficacy and safety of desmoteplase in subjects with acute ischemic stroke	International Clinical Research, H. Lundbeck A/S	\$16,774
Demchuk, Andrew	Efficient/Effective Delivery & Followup of Cardiovascular Implantable Electrical Devices in Alberta: Performance Evaluation & Rhythm Followup Optimization with Remote Monitoring (PERFORM) Collaborative Project	Alberta Innovates - Health Solutions (AIHS)	\$749,875
Demchuk, Andrew	Identifying New approaches to optimize Thrombus characterization for predicting Early Recanalization and Reperfusion with iv tPA using Serial CT angiography (INTERRSeCT)	Canadian Institutes of Health Research	\$100,000
Demchuk, Andrew	Identifying New approaches to optimize Thrombus characterization for predicting Early Recanalization and Reperfusion with iv tPA using Serial CT angiography (INTERRSeCT)	Canadian Institutes of Health Research	\$261,447
Demchuk, Andrew	MRI of Reperfusion following Endovascular treatment using Perfusion/Permeability to Evaluate Regional infarction to Understand Stroke Evolution (REPERFUSE)	Heart & Stroke Foundation of Canada	\$104,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Demchuk, Andrew	Precise and Rapid assessment of collaterals using multi-phase CTA in the triage of patients with acute ischemic stroke IA Therapy (PROVE-IT)	Canadian Institutes of Health Research	\$295,000
Demchuk, Andrew	Predicting hEmatoma growth and outcome in Intracerebral hemorrhage using contrast bolus CT (PREDICT) study	Novo Nordisk Canada	\$62,000
Demchuk, Andrew	Quality Improvement Clinical Research (QuICR) Stroke Program	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Demchuk, Andrew	Rehabilitation, Stroke Deficits And Robotic Technology (RESTART)	Canadian Institutes of Health Research	\$843,555
Demchuk, Andrew	Spot Sign Selection of Intracerebral Hemorrhage to Guide Hemostatic Therapy (SPOTLIGHT): A Randomized Controlled Study	Canadian Institutes of Health Research	\$1,456,206
Demchuk, Andrew	Spousal relationships and neurobehavioural sequelae post-mild stroke	Heart & Stroke Foundation of Canada	\$156,000
Feasby, Thomas	International Guillain-Barré Syndrome Outcome Study (IGOS)	Research with no funding or non-peer reviewed support	\$10,000
Feasby, Thomas	International Guillain-Barré Syndrome Outcome Study (IGOS)	Research with no funding or non-peer reviewed support	\$10,000
Feasby, Thomas	International Guillain-Barré Syndrome Outcome Study (IGOS)	Research with no funding or non-peer reviewed support	\$22,356
Federico, Paulo	Neurovascular changes associated with the pre-ictal state	Cumming School of Medicine	\$20,000
Federico, Paulo	Neurovascular changes preceding seizures	Hotchkiss Brain Institute	\$20,000
Federico, Paulo	Predicting seizure onset	Canadian Institutes of Health Research	\$609,245
Federico, Paulo	Voxel-based relaxometry in focal epilepsy	Epilepsy Canada	\$100,000
Fletcher, William A.	Study of the Vestibulo-Ocular Reflex in Normal Subjects and Patients with Vestibular Dysfunction	Rosza Endowment for Hearing Research	\$24,600
Fletcher, William A.	Neuro-Ophthalmology Research Disease Consortium (site principal investigator), 2012 - 14, Idiopathic Intracranial Hypertension Treatment Trial (IIHTT) and Longitudinal IIHTT,	NIH	\$25,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Hill, Michael Douglas	Quality Improvement Clinical Research (QulCR): Alberta Stroke Program	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Hill, Michael Douglas	(ESCAPE) Endovascular treatment for Small Core and Anterior circulation Proximal occlusion with Emphasis on minimizing CT to recanalization times	Covidien	\$2,700,000
Hill, Michael Douglas	CREST - Carotid Revascularization Endarterectomy Stenting Trial	US Public Health Services	\$61,603
Hill, Michael Douglas	DOUBT - Diagnosis Of Uncertain-origin Benign Transient neurological symptoms	Canadian Institutes of Health Research	\$594,855
Hill, Michael Douglas	EMBRACE (30-Day Cardiac Event Monitor Belt for Recording Atrial Fibrillation After a Cerebral Ischemic Event: A Randomized Controlled Trial)	Canadian Stroke Network	\$1,350
Hill, Michael Douglas	Enhancement of developmental motor plasticity in perinatal stroke with TDCS	Heart & Stroke Foundation of Canada	\$270,000
Hill, Michael Douglas	Identifying Novel approaches to optimize arterial imaging interpretation for predicting and measuring recanalization whatever the Treatment and to optimize parenchymal imaging interpretation for prediction of Early neurological Recovery after Recanalization using Serial CT angiography (INTERRSCT TRIAL)	Canadian Institutes of Health Research	\$261,446
Hill, Michael Douglas	PeriOperative ISchemic Evaluation-2 (POISE-2) Trial	Canadian Institutes of Health Research	\$3,684,006
Hill, Michael Douglas	RESPECT (Randomized Evaluation of Recurrent Stroke comparing PFO Closure to Established Current Standard of Care Treatment)	Bayer	\$1,037
Hill, Michael Douglas	Spousal relationships and neurobehavioural sequelae post-mild stroke	Heart & Stroke Foundation of Canada	\$156,000
Hill, Michael Douglas	Strategic Team in Applied Injury Research	Canadian Institutes of Health Research	\$2,000,000
Hill, Michael Douglas	TEMPO-1. Thrombolysis for Minor Ischemic Stroke With Proven Acute Symptomatic Occlusion Using Tnk-tPA	Heart & Stroke Foundation of Canada	\$150,000
Hill, Michael Douglas	The Neurological disease and Depression Study (NEEDS)	Hotchkiss Brain Institute	\$150,000
Hill, Michael Douglas	TWiST2 (Tissue Windown in Stroke Thrombolysis Part 2)	Heart & Stroke Foundation of Canada	\$57,000
Jetté, Nathalie	A European pilot network of reference centres in refractory epilepsy and epilepsy surgery	European Commission - Executive Agency for Health and Consumers	\$1,429,420

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Jetté, Nathalie	Development of an appropriateness and necessity rating tool to identify patients with potentially resectable focal epilepsy	Alberta Innovates - Health Solutions (AIHS)	\$952,000
Jetté, Nathalie	Enhancing existing capacity in applied health services and policy research in Western Canada	CIHR - Program: Training Grants	\$1,789,998
Jetté, Nathalie	Neuroscience Health Services Research	Canada Research Chair Tier 2	\$500,000
Jetté, Nathalie	Non-invasive evaluation of intracranial hypertension in severe traumatic brain injury	University of Calgary Seed Grant Program	\$17,732
Jetté, Nathalie	Robust measures of domain importance for response shift detection in longitudinal health-related quality of life data	University of Calgary Seed Grant	\$14,864
Jetté, Nathalie	Supporting family caregivers of seniors: Improving care and caregiver outcomes	Canadian Institutes of Health Research	\$23,490
Jetté, Nathalie	The Neurological and Mental Health Network	Alberta Innovates - Health Solutions (AIHS)	\$23,641
Jetté, Nathalie	The Neurological Disease and Depression Study (NEEDS)	Alberta Health Services, U of C Cumming School of Medicine, Hotchkiss Brain Institute	\$450,000
Koch, Marcus	Analyses of functional outcomes to determine optimal cut-scores which represent disability progression in MS, as well as to validate thresholds which represent clinically meaningful change in the PROMISE randomized controlled trial	TEVA Pharmaceuticals	\$9,996
Koch, Marcus	Discretionary funds for MS research	University of Calgary	\$200,000
Koch, Marcus	Medicines for remyelination in MS: the next frontier	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Koch, Marcus	The Alberta MS Initiative (TAMSI)	Alberta Health	\$1,000,000
Korngut, Lawrence	The Canadian Neuromuscular Disease Network (CAN-NMD)	Canadian Institutes of Health Research	\$575,613
Korngut, Lawrence	The Canadian Neuromuscular Disease Network (CAN-NMD)	Muscular Dystrophy Canada	\$165,820
Korngut, Lawrence	Magnetic resonance imaging biomarkers in ALS	Canadian Institutes of Health Research	\$841,747
Menon, Bijoy	Comparing collaterals across different vascular beds	HBI/DCNS	\$20,000
Menon, Bijoy	Determinants of Variability in Collateral Status in Patients with Acute Ischemic Stroke	Heart & Stroke Foundation of Canada	\$100,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Menon, Bijoy	Endovascular treatment for Small Core and Anterior circulation Proximal occlusion with Emphasis on minimizing CT to recanalization times (ESCAPE)	Industry	\$2,700,000
Menon, Bijoy	Identifying New approaches to optimize Thrombus characterization for predicting Early Recanalization and Reperfusion with iv tPA and other treatments using Serial CT angiography (INTERRSeCT)	Canadian Institutes of Health Research	\$361,447
Menon, Bijoy	Managing Cardiovascular Contractile Abnormalities with a Novel Inhibitor of Zipper-interacting Protein Kinase	Alberta Innovates - Health Solutions (AIHS)	\$200,000
Menon, Bijoy	MRI of Reperfusion following Endovascular treatment using Perfusion/ Permeability to Evaluate Regional inFarction to Understand Stroke Evolution (REPERFUSE)	Heart & Stroke Foundation of Canada	\$104,000
Menon, Bijoy	Precise and Rapid assessment of collaterals using multi-phase CTA in the triage of patients with acute ischemic stroke for IA Therapy (PRoVe-IT)	Canadian Institutes of Health Research	\$295,000
Menon, Bijoy	Precise and Rapid assessment of collaterals using multi-phase CTA in the triage of patients with acute ischemic stroke for IA Therapy (PRoVe-IT)	Cumming School of Medicine	\$20,000
Menon, Bijoy	QuICR: Quality Improvement, Clinical Research: Acute Stroke – The First 12 Hours	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Menon, Bijoy	Seeking Novel Approaches to Augment Collateral Blood Flow to Ischemic Brain Tissue	Cumming School of Medicine	\$200,000
Menon, Bijoy	Heart and Stroke Professorship in Stroke Imaging	Heart & Stroke Foundation of Canada	\$300,000
Metz, Luanne	Combi-RX: A Multi-Centre, Double-Blind, Randomized Phase III Study Comparing Combined Use of Interferon Beta-1a and Glatiramer Acetate to Either Agent Alone in Patients with Relapsing-Remitting Multiple Sclerosis	NIH	\$260,000
Metz, Luanne	Implementation of the Canadian MS Monitoring System in Calgary - Local Principal Investigator	Alberta Health	\$100,000
Metz, Luanne	Medicines for Remyelination in MS: The Next Frontier - Principal Investigator (Projectd 4 - Remyelination Trial in RRMS)	Alberta Innovates - Health Solutions (CRIO)	\$500,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Metz, Luanne	HMR 1726D/2001/2002, Phase II Study of the safety and efficacy of teriflunomide in Multiple Sclerosis with relapses (study extensions)		\$102,781
Metz, Luanne	Mental Health and Disability in People with MS	Alberta Mental Health Research Fund	\$210,000
Metz, Luanne	Phase III double-blind, randomized, placebo-controlled trial of minocycline in clinically isolated syndrome (CIS)	Multiple Sclerosis Society of Canada	\$4,050,000
Metz, Luanne	Safety and tolerability of quetiapine in multiple sclerosis		\$12,000
Metz, Luanne	The Alberta MS Initiative (TAMSI): Phase I Multiple Sclerosis Database to Study Chronic Cerebrospinal Venous Insufficiency (CCSVI)	Alberta Health and Wellness	\$1,000,000
Pringsheim, Tamara	A scoping review of pediatric mental health related emergency department discharge instructions	Nova Scotia Health Research Foundation	\$15,000
Pringsheim, Tamara	Assessment and treatment of aggression in children with disruptive behaviour disorders: Development of an educational curriculum for residency education	Sick Kids Foundation & Royal Bank of Canada	\$114,000
Pringsheim, Tamara	Assessment and treatment of aggression in children with disruptive behaviour disorders: Development of an educational curriculum for residency education and an eCME program	Canadian Institutes of Health Research	\$24,891
Pringsheim, Tamara	Knowledge translation and dissemination of an antipsychotic safety monitoring guideline for children	Canadian Institutes of Health Research	\$75,227
Pringsheim, Tamara	Knowledge Translation of the Canadian Guidelines on the Treatment of Tourette Syndrome	Private donation	\$10,000
Pringsheim, Tamara	Knowledge Translation of the Canadian Guidelines on the Treatment of Tourette Syndrome	Private donation	\$10,000
Pringsheim, Tamara	Monitoring Antipsychotic Safety in Children: Knowledge Translation and Exchange of the CAMESA Guideline	Alberta Innovates - Health Solutions (AIHS)	\$19,025
Rho, Jong	Novel Screening Platform to Uncover Atypical Teratoid/Rhabdoid (AT/RT) Tumour Therapeutics	Kids Cancer Care (KCC) Chair in Pediatric Oncology Grant, University of Calgary	\$46,860
Rho, Jong	Personalized Medicine in the Treatment of Epilepsy (Total multi-site grant: \$15,923,643)	Genome Canada, Multi-Centre Research Grant	\$TBD

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Rho, Jong	Mesenchymal Stem-Cell Based Mitochondrial Transfer for the Treatment of Mitochondrial Disease	Mito Canada	\$50,000
Rho, Jong	Modulation of Brain-Specific ATP-Sensitive Potassium Channels by Physiological Stereoisomers of the Primary Ketone Body Beta-Hydroxybutyrate	Canadian Institutes for Health Research (CIHR)	\$712,613
Rho, Jong	Metabolic Mechanisms of Functional Neuroprotection in Epileptic Brain	National Institute of Neurological Disorders and Stroke, National Institutes of Health, Research Program Grant	\$2,000,000
Rho, Jong	Physiological Changes in L-(+)-Beta-Hydroxybutyrate Levels in Medically Refractory Epileptic Patients Treated with an Anticonvulsant Ketogenic Diet	Alberta Children's Hospital Research Institute, Large Grant Award	\$39,356
Smith, Eric E.	A Centre for Clinical Research in Cognitive Disorders and Dementia	Ronald and Irene Ward Foundation	\$750,000
Smith, Eric E.	Canadian Consortium on Neurodegeneration in Aging	Canadian Institutes of Health Research	\$750,000
Smith, Eric E.	Cardiovascular and Cognitive Dysfunction (CVCD) Alliance	Canadian Partnership Against Cancer	\$750,000
Smith, Eric E.	Cerebral Small Vessel Disease and Beta-Amyloid Deposition in Subjects with Mildly Impaired Cognition	Alberta Innovates - Health Solutions (AIHS)	\$420,000
Smith, Eric E.	Cerebral Small Vessel Disease and Beta-Amyloid Deposition in Subjects with Mildly Impaired Cognition	Canadian Institutes of Health Research	\$300,000
Smith, Eric E.	Cognition and Vascular Function in Cerebral Amyloid Angiopathy	Heart & Stroke Foundation of Canada	\$171,000
Smith, Eric E.	Effectiveness of Aliskiren on Progression of White matter disease: An MRI Assessment Sub-Study of the Aliskiren in the Prevention of Major Cardiovascular Events in Elderly People (APOLLO) trial	Population Health Research Institute	\$80,000
Smith, Eric E.	MR Quantitative Iron Imaging in Alzheimer's Disease and Dementia	Alberta Innovates - Health Solutions (AIHS)	\$200,000
Smith, Eric E.	Neuropsychological and Cerebral Blood Flow Profile of Cerebral Amyloid Angiopathy	Alzheimer Society of Canada	\$37,848
Smith, Eric E.	PURE-MIND: A Population-based Study of Covert Cerebrovascular Disease and Its Contribution to Age-Related Cognitive Decline	Canadian Institutes of Health Research	\$1,200,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Smith, Eric E.	Funding for Master Student	Katthy Taylor Vascular Dementia Research Chair	\$22,000
Smith, Eric E.	Relationship Between "Covert" Brain Ischemia and Cognitive and Physical Decline in Middle-Aged Canadians	Heart & Stroke Foundation of Canada	\$139,000
Smith, Eric E.	Small vessel disease and beta-amyloid deposition in mildly impaired cognition	U.S. National Institute of Neurological Disorders and Stroke	\$1,800,000
Smith, Eric E.	Standards for Determining the Vascular Contribution to Neurodegeneration	Canadian Institutes of Health Research	\$33,167
Stys, Peter	Axo-glial Biology	Canada Research Chairs (CRC)	\$1,200,000
Stys, Peter	Pathobiology of MS: complex interplay between degeneration and inflammation	Multiple Sclerosis Scientific Research Foundation	\$3,900,000
Stys, Peter	Role of NMDA receptors in AD pathology - a complex interaction with TAU and cellular prion protein	Alberta Prion Research Institute	\$200,000
Stys, Peter	Scientist Award	Alberta Innovates - Health Solutions (AIHS)	\$1,190,000
Stys, Peter	The axo-myelinic synapse	Canadian Institutes of Health Research	\$845,320
Toth, Cory	A Mechanistic Investigation of Behavioral Co-morbidity in Chronic Inflammatory Disorders	Alberta Innovates - Health Solutions (AIHS)	\$250,000
Toth, Cory	A randomized controlled double blind study of morphine vs. methadone in chronic neuropathic pain	Canadian Institutes of Health Research	\$120,000
Toth, Cory	A randomized study of telemedicine in management of chronic neuropathic pain	Lilly International	\$33,000
Toth, Cory	IVIG and experimental diabetic neuropathic pain	Baxter Ltd	\$200,000
Toth, Cory	SCIG and the modulation of neuroinflammation in early diabetic neuropathy	CSL Interlaken Award	\$150,000
Toth, Cory	The development of peripheral neuropathy in Parkinson's disease	HBI CRU	\$16,000
Toth, Cory	The development of peripheral neuropathy in Parkinson's disease	Parkinson Society of Canada	\$32,000
Toth, Cory	The role of hyperlipidemia in diabetic leukoencephalopathy	Heart & Stroke Foundation of Canada	\$185,000

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Toth, Cory	The role of hyperlipidemia in diabetic neuropathy	HBI CRU	\$13,000
Wiebe, Samuel	Efficacy and safety of conversion to lacosamide 400mg/day monotherapy in subjects with partial-onset seizures	UCB	\$9,731
Wiebe, Samuel	Efficacy and Safety of Brivaracetam in patients with partial onset Seizures	UCB	\$8,572
Wiebe, Samuel	Efficacy and safety of E2007 (Perampanel) in refractory partial seizures	Eisai	\$18,000
Wiebe, Samuel	Efficacy and safety of E2007 (Perampanel) in refractory partial seizures (E2007-G000-304)	Eisai	\$13,828
Wiebe, Samuel	Followup study of Long Term Safety and Efficacy of Brivaracetam used as adjunctive treatment in partial onset seizures	UCB	\$9,313
Wiebe, Samuel	Hopewell Professorship for Clinical Neurosciences Research	Hopewell Professorship	\$1,000,000
Wiebe, Samuel	Knowledge Translation Supplementation Improving appropriate care for those with Epilepsy - Knowledge translation of the CASES clinical decisions support tool	Canadian Institutes of Health Research	\$90,000
Wiebe, Samuel	Long-term use and safety of lacosamide monotherapy as adjunctive therapy in patients with partial-onset seizures	UCB	\$8,215
Wiebe, Samuel	Neurological registry best practice guidelines and implementation toolkit	Public Health Agency of Canada	\$209,496
Wiebe, Samuel	Prospective assessment electroencephalography in comatose neurocritical care patients	Hotchkiss Brain Institute Clinical Research Unit	\$15,000
Wiebe, Samuel	The Neurological disease and Depression Study (NEEDS) - addressing the burden course and impact of depressive disorders in neurological conditions	Alberta Health Services and Hotchkiss Brain Institute	\$450,000
Wiebe, Samuel	Understanding the epidemiology of neurological conditions	Public Health Agency of Canada	\$402,000
Zochodne, Douglas W.	Corneal confocal microscopy to detect diabetic neuropathy in children	Juvenile Diabetes Foundation	\$360,000
Zochodne, Douglas W.	DCC Pilot & Feasibility Study: "Pten Knockdown: A Novel Strategy to Reverse Diabetic Neuropathy"	National Institutes of Health Research (NIH US)	\$88,869

Grants

Neurology (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Zochodne, Douglas W.	Diabetes and Skin Sensation	Canadian Diabetes Association	\$274,590
Zochodne, Douglas W.	Diabetes, neuron degeneration & insulin signalling	Canadian Institutes of Health Research	\$559,725
Zochodne, Douglas W.	Molecular Roadblocks to Nerve Regeneration	Canadian Institutes of Health Research	\$692,860
Zochodne, Douglas W.	Molecular Roadblocks to Nerve Regeneration	Canadian Institutes of Health Research	\$138,572
Zochodne, Douglas W.	Pain relief: receptor dynamics at the single molecule level	NSERC	\$363,000
Zochodne, Douglas W.	Peripheral neuropathy in Lentivirus infections: early viral and determinants of neurovirulence	NIH	\$1,230,000
Zochodne, Douglas W.	Regeneration Unit in Neurobiology (RUN)	Canadian Foundation for Innovation (CFI)	\$3,240,930

Grants

Neurosurgery

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Casha, Steve	Minocycline in Acute Spinal Cord Injury - a Canadian multi-centre study (MASC)	Alberta Paraplegic Foundation	\$140,256
Casha, Steve	The Graded and Redefined Assessment of Strength, Sensibility and Prehension (GRASSP): Responsiveness Testing Prior to Utilization in Clinical Trials, Minimally Clinical Important Difference and Meaningfulness of Change of the GRASSP	Alberta Paraplegic foundation	\$50,000
Casha, Steve	MASC - Minocycline in acute spinal cord injury	Rick Hansen Institute	\$1,300,000
Casha, Steve	The Graded and Redefined Assessment of Strength, Sensibility and Prehension (GRASSP): Responsiveness Testing Prior to Utilization in Clinical Trials, Minimally Clinical Important Difference and Meaningfulness of Change of the GRASSP	Alberta Paraplegic Foundation	\$50,000
Casha, Steve	MASC - minocycline in acute spinal cord injury	Alberta Paraplegic Foundation	\$140,256
Casha, Steve	"MASC" - Minocycline in Acute Spinal Cord Injury	Rick Hansen Man in Motion Legacy Fund	\$1,300,000
Gallagher, Clare	Cerebral Energy Metabolism in Injured and Uninjured Brain	Medical Research Council	\$800,000
Gallagher, Clare	Cerebral metabolism in Severe Traumatic Brain Injury	HBI Rebecca Hotchkiss International Scholar Exchange	\$4,000
Hamilton, Mark	Adult Hydrocephalus Clinical Research Network Core Data Project		\$75,000
Hamilton, Mark	Adult Hydrocephalus Clinical Research Network Core Data Project		\$200,000
Hamilton, Mark	Team Leader for Hydrocephalus: Neurological Registry Best Practice Guidelines and Implementation Toolkit Project" with (2011-2013)	Public Health Agency of Canada	\$209,496
Hamilton, Mark	Understanding the epidemiology of neurological conditions and building the methodological foundation for surveillance" with Dr. N Jetté (210-2013)	Public Health Agency of Canada	\$402,000
Hamilton, Mark	Phase 1 pharmacodynamic and "high content" study of the gamma-secretase inhibitor RO4929097 in patients with recurrent malignant gliomas targeting p75NTR to inhibit brain tumour initiating cells and recurrent invasive gliomas	National Cancer Institute of Canada	\$312,740

Grants

Neurosurgery (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Hurlbert, R. John	Surgery vs. Conservative Management of Type II Odontoid Fractures	AANS/CNS Apfelbaum Award	\$45,000
Hurlbert, R. John	AANS/CNS Neuropoint Alliance SD	AANS/CNS	\$10,000
Hurlbert, R. John	SCI Registry		\$60,000
Hurlbert, R. John	Novartis SCI Trial		\$30,000
Jacobs, W. Bradley	Efficacy of Riluzole in Patients with Cervical Spindylotic Myelopathy Undergoing Surgical Treatment. A Multi-Centre Randomized Trial	AO Spine North America	
Jacobs, W. Bradley	Mean Arterial Pressure in Spinal Cord Injury (MAPS): Determination of non-inferiority of a mean arterial pressure of 65 mmHg compared to a mean arterial pressure of 85 mmHg in acute human traumatic spinal cord injury	AANS/CNS Section of Spine and Peripheral Nerves	\$50,000
Jacobs, W. Bradley	Canadian Multi-centre CSF Pressure Monitoring and Biomarker (CAMPER) Study	Alberta Paralysis Foundation	\$160,000
Kelly, John	Research startup funds	DCNS and SACRI	\$100,000
Kelly, John	Activating macrophages and microglia to suppress brain tumour initiating cells	Alberta Innovates - Health Solutions (AIHS)	\$250,000
Kelly, John	Non-invasive evaluation of intracranial pressure	University of Calgary	\$15,000
Kelly, John	Combinatorial treatment of glioblastoma initiating cells with microglial cytokines and STAT3 inhibition	2014 Brain Tumour Foundation of Canada Research Grant	\$25,000
Kiss, Zelma	Equipment repair and replacement grant	Hotchkiss Brain Institute	\$10,000
Kiss, Zelma	Sensory cueing, neuroplasticity and Parkinson's disease rehabilitation	Canadian Institutes of Health Research	\$1,500,000
Kiss, Zelma	Deep brain stimulation for treatment resistant depressive disorders	Alberta Innovates - Health Solutions (AIHS)	\$750,000
Kiss, Zelma	Mechanisms of therapeutic deep brain stimulation (DBS) for dystonia	Canadian Institutes of Health Research	\$383,947
Kiss, Zelma	Smart Neural Prostheses to Restore Motor and Sensory Function	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Kiss, Zelma	Stereotactic & Functional Neurosurgery fellowship		\$10,000
Kiss, Zelma	Stereotactic & Functional Neurosurgery fellowship		\$10,292
Midha, Rajiv	Peripheral nerve regeneration lab operating support	University of Calgary, Alberta Health Services	\$100,000

Grants

Neurosurgery (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Midha, Rajiv	Characterization of SKP-SC produced myelin	Plastic Surgery Education Foundation	\$10,000
Midha, Rajiv	Schwann cell therapy to reduce annual attrition and misdirection in the injured nerve	David Kline Research Award	\$15,000
Midha, Rajiv	Peripheral Nerve Fellowship at the University of Calgary	Integra LifeScience Foundation	\$25,000
Midha, Rajiv	Eyes High Fellowship Program Award	University of Calgary	\$100,000
Midha, Rajiv	Bioprocess production of skin derived precursor (SKP) Schwann cell as autologous cell therapy for nerve and spinal cord repair	Alberta Innovates - Health Solutions (AIHS)	\$750,000
Midha, Rajiv	Determining and optimizing the myelination capacity of skin derived precursors	Alberta endMS RRTC	\$15,000
Midha, Rajiv	Stem cell therapies for nerve repair and regeneration	HBI and Integra LifeSciences Centre of Excellence in Nerve Regeneration at University of Calgary	\$75,000
Mitha, Alim	Tissue Engineering to Treat Intracranial Saccular Aneurysms		\$400,000
Mitha, Alim	Changes in Intra-Aneurysmal Pressure after Flow Diversion	Hotchkiss Brain Institute	\$20,000
Mitha, Alim	Drug-Eluting Bioabsorbable Stents for the Treatment of Cerebral Vasospasm Following Subarachnoid Hemorrhage	Brain Aneurysm Foundation	\$10,000
Mitha, Alim	A Bioabsorbable Self-Expanding Stent to Treat Intracranial Aneurysms	Zymetrix	\$42,000
Starreveld, Yves P.	Improve surgical safety and efficacy with a novel image guidance system that enhances endoscopic surgery while requiring less workflow adaptation in the operating room. Increase the adoption of image guidance surgery for endoscopic procedures	Canadian Institutes of Health Research	
Starreveld, Yves P.	DBS for treatment resistant depression	Alberta Health	
Starreveld, Yves P.	NSERC CREATE International and Industrial Imaging Training (I3T) Program	NSERC	
Starreveld, Yves P.	Deep Brain Stimulation for Treatment Resistant Depressive Disorders	Alberta Innovates - Health Solutions (AIHS)	\$750,000
Starreveld, Yves P.	Deep Brain Stimulation for Treatment Resistant Depressive Disorders	Alberta Innovates - Health Solutions (AIHS)	\$750,000
Sutherland, Garnette	Ceramic Aneurysm Clips		\$0

Grants

Neurosurgery (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Sutherland, Garnette	Connectivity		\$200,000
Sutherland, Garnette	Advancing iMRI	Calgary Health Trust	\$1,800,000
Sutherland, Garnette	Project NeuroArm: MR Compatible image-guided robot for microsurgery	Alberta Science and Research Authority	\$3,000,000
Sutherland, Garnette	Development of an MR visible Biomarker for Tau following Mild Traumatic Brain Injury	Canadian Institutes of Health Research	\$100,000
Sutherland, Garnette	Development of an MR visible Biomarker for Traumatic Brain Injury	nanoBridge	\$75,000
Wong, John	ACORN (Alberta Comprehensive Outcomes Research in Neurosciences) database		\$114,000
Wong, John	ACST-2 (Asymptomatic Carotid Stenosis Trial)		\$0
Wong, John	CURES (Canadian Unruptured Endovascular Coiling versus Surgical Clipping Aneurysm study)		\$0
Wong, John	STAR (Solitaire FR Thrombectomy for Acute Revascularization) study		\$0
Wong, John	PED (Pipeline Embolization Device Post Approval Registry)		\$2,000
Wong, John	Newton: Phase 1/2A Multi-centre, Controlled, Randomized, Open-Label, Dose Escalation, Safety, Tolerability, And Pharmacokinetic Study Comparing Eg-1962 And Nimodipine In Patients With Aneurysmal Subarachnoid Hemorrhage		\$12,000

Grants

Physical Medicine & Rehabilitation

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Benson, Brian	Sport Concussion Clinical Research, University of Calgary	Philanthropic donation	\$18,000
Benson, Brian	Quantitative Assessment of Acute Post-Concussion Sensorimotor and Neurocognitive Impairment and Recovery using Robotics in High-Risk Athletes	Canadian Academy of Sport and Exercise Medicine Research Committee	\$10,000
Benson, Brian	KINARM End-Point Robotic Device with Gaze Tracking and Vestibular Module. Own the Podium, Canada	Innovations 4 Gold Research Funding	\$202,510
Barton, Pamela	2013-14 Model of Care (MOC) Catalyst Grant Competition (2013).	Arthritis Society	\$54,112
Clark, Terry	Developing a dancer wellness program employing developmental evaluation	University of Calgary Open Access Author Fund	\$1,400
Clark, Terry	Performing arts medicine: Research, education, and clinical perspectives	Calgary Pain Education Foundation	\$3,000
Clark, Terry	Performing arts medicine: Research, education, and clinical perspectives	Axon Biology Group - University of Calgary	\$2,000
Debert, Chantel	Safe to Play study	Canadian Institutes of Health Research	\$1,500,000
Debert, Chantel	University of Calgary - AHS	Division of Clinical Neurosciences	\$12,000
Debert, Chantel	University of Calgary - Division of Clinical Neurosciences (Start up grant)	Division of Clinical Neurosciences - University of Calgary	\$30,000
Dukelow, Sean Peter	A Randomized Controlled Trial of Early Robotic Rehabilitation of the Upper Limb following Stroke	Heart & Stroke Foundation of Canada	\$316,654
Dukelow, Sean Peter	Development of an inpatient stroke rehabilitation clinical trials network	Canadian Stroke Recovery Network	\$340,000
Dukelow, Sean Peter	Efficacy of Virtual Reality Exercises using Wii gaming technology in Stroke Rehabilitation: A multi centre randomized clinical trial (EVREST Multi-centre)	Heart & Stroke Foundation of Canada	\$162,884
Dukelow, Sean Peter	Enhancement of developmental motor plasticity in perinatal stroke with TDCS	Heart & Stroke Foundation of Canada	\$270,000
Dukelow, Sean Peter	Limb Proprioception in Children with Perinatal Stroke Induced Cerebral Palsy	Cerebral Palsy International Research Foundation	\$100,000
Dukelow, Sean Peter	Prevention of Pressure Ulcers in the Intensive Care Unit using Intermittent Electrical Stimulation	Alberta Innovates - Technology Futures	\$135,748

Grants

Physical Medicine & Rehabilitation (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Dukelow, Sean Peter	Rehabilitation, Stroke Deficits and Robotic Technology (RESTART)	Canadian Institutes of Health Research	\$199,348
Dukelow, Sean Peter	Rehabilitation, Stroke Deficits and RoboTics (RESTART II)	Canadian Institutes of Health Research	\$843,556
Dukelow, Sean Peter	Safe to Play study	Canadian Institutes of Health Research	\$1,500,000
Dukelow, Sean Peter	Smart Neural Prostheses to restore sensory and motor function – an inter-disciplinary team grant	Alberta Innovates - Health Solutions (AIHS)	\$5,000,000
Gabriel Vincent	Autologous Skin Derived Precursors for Improvement of Split Thickness Skin Grafts	Alberta Innovates - Health Solutions (AIHS)	\$1,125,000
Ho, Chester Ho Kai	A Prospective Case Series Evaluating the Safety of the KLOX Biophotonic System in Stage II and III Pressure Ulcers	KLOX Technologies	\$54,457
Ho, Chester Ho Kai	Alberta Ballet Wellness Initiative	Private donation	\$200,000
Ho, Chester Ho Kai	Alberta SCI Research Facilitator	Alberta Paraplegic Foundation	\$195,000
Ho, Chester Ho Kai	Alberta SCI Research Support Fund	Alberta Paraplegic Foundation	\$107,850
Ho, Chester Ho Kai	Building the Rick Hansen Alberta Spinal Cord Injury Registry	Brain Canada	\$900,000
Ho, Chester Ho Kai	Calgary Performance Arts Medicine Conference	Alberta Innovates - Health Solutions (AIHS)	\$5,000
Ho, Chester Ho Kai	Calgary Spinal Cord Injury Facilitator	Alberta Paraplegic Foundation	\$195,000
Ho, Chester Ho Kai	Multi-Modal SCI Patient Education Across the Care Continuum and Lifespan	Craig Neilsen Foundation	\$49,390
Ho, Chester Ho Kai	Neurorehabilitation Program, UCAN Initiative	Hotchkiss Brain Institute	\$114,970
Ho, Chester Ho Kai	Spinal cord injury research support fund	Alberta Paraplegic Foundation	\$107,850
Ho, Chester Ho Kai	W21C: Interdisciplinary Research and Innovation for Health System Quality and Safety. Project Lead for Project A: Efficacy of a pressure-sensing mattress system for preventing pressure ulcerations in vulnerable patient populations: A randomized controlled trial	Alberta Innovates - Health Solutions (AIHS)	\$4,679,602
Simonett, Gillian	SEED Grant for research	ASCI	\$10,000

Grants

Translational Neuroscience

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Hu, Bin	AmbuloSono: a sensorimotor contingent musical walking program for people living with Parkinson's disease	Alberta Innovates - Health Solutions (AIHS)	\$750,000
Hu, Bin	Audition and Autism	2009-2011 Sinneave Family Foundation	\$80,000
Hu, Bin	Implementation of a music based walking program for clients of Parkinson Alberta Society	Parkinson Alberta Society	\$15,000
Hu, Bin	Music therapy for Parkinson's disease		\$6,000
Hu, Bin	Sensorimotor Cueing, Neuroplasticity and Motor Rehabilitation	Canadian Institutes for Health Research	\$1,500,000
Hu, Bin	The Neurological Disease and Depression Study (NEEDS) - Understanding the burden, course and impact of depressive disorders in neurological conditions		\$100,000
Hulinger, Manuel	Neuro-locomotor rehabilitation after large-fibre somatosensory loss	Canadian Institutes for Health Research	\$706,730
Nguyen, Minh Dang	Molecular mechanisms underlying neuropsychiatric disorders centered on Ndel1-DISC1	National Research Foundation of Korea	\$25,000
Nguyen, Minh Dang	Structuring and signaling roles of the cytoskeleton in neuronal survival	Canadian Institutes for Health Research	\$700,000
Nguyen, Minh Dang	Surviving the break-up in DNA damage response with a novel partner. TPX2	Canadian Institutes for Health Research	\$270,000
Ousman, Shalina S.	Endogenous protective mechanisms in multiple sclerosis	Hotchkiss Brain Institute	\$43,750
Ousman, Shalina S.	Equipment grant	Hotchkiss Brain Institute	\$3,000
Ousman, Shalina S.	Establishment of microscopy and real-time quantitative PCR infrastructure to investigate neurodegenerative disorders	Canada Foundation for Innovation	\$80,305
Ousman, Shalina S.	Function of alphaB-crystallin in multiple sclerosis	Alberta Innovates - Health Solutions (AIHS)	\$5,000
Ousman, Shalina S.	Function of alphaB-crystallin in multiple sclerosis	Alberta Innovates - Health Solutions (AIHS)	\$20,000
Ousman, Shalina S.	Investigating the role of Cystatin C in multiple sclerosis	Canadian Institutes for Health Research	\$182,000

Grants

Translational Neuroscience (cont'd)

RECIPIENT	GRANT	FUNDING SOURCE	AMOUNT
Ousman Shalina S.	Investigating the role of Cystatin C in multiple sclerosis	Multiple Sclerosis Society of Canada	\$28,732
Ousman Shalina S.	Mechanisms underlying alphaB-crystallin function in multiple sclerosis	Canadian Institutes for Health Research	\$117,249
Ousman, Shalina S.	Mechanisms underlying regeneration of the injured peripheral nervous system	Alberta Innovates - Health Solutions (AIHS)+ Cumming School of Medicine	\$43,969
Ousman, Shalina S.	The alphaB-crystallin of peripheral nerve regeneration	University of Calgary Research Grant Committee	\$8,750
Yong, V. Wee	A phase III double-blind, randomized, placebo-controlled trial of minocycline in clinically isolated syndromes (CIS)	MS Society of Canada Foundation Grant	\$150,000
Yong, V. Wee	Activating microglia and macrophages to suppress brain tumour initiating cells	Alberta Innovate Health Solutions - CRIO Cancer Project	\$100,000
Yong, V. Wee	Chondroitin sulfate proteoglycans (CSPGs) as inhibitors of remyelination in MS	MS Society of Canada	\$100,000
Yong, V. Wee	Defining EMMPRIN as a key regulator of neuroinflammation and neural injury in multiple sclerosis	Canadian Institutes for Health Research	\$184,150
Yong, V. Wee	Endogenous progenitor cell repair in multiple sclerosis	Stem Cell Network	\$783,600
Yong, V. Wee	Enhancing monocytoid cell activity to curb brain tumour initiating cells	Alberta Innovates/Alberta Cancer Foundation	\$150,000
Yong, V. Wee	Medicines for remyelination in Multiple Sclerosis: The Next Frontier	Alberta Innovates Health Solutions - CRIO Team Grant	\$1,000,000
Yong, V. Wee	N-acetylglucosamine analogs that promote remyelination and reduce detrimental inflammation: Novel therapeutics for multiple benefits in multiple sclerosis	Alberta/Pfizer Translational Research Fund Opportunity	\$200,000
Yong, V. Wee	Pathobiology of MS: complex interplay between degeneration and inflammation	MS Society of Canada Foundation Grant	\$175,000
Yong, V. Wee	Regulation of neuroinflammation and neuropathology in multiple sclerosis by the MMP inducer, EMMPRIN	Canadian Institutes for Health Research	\$816,585
Yong, V. Wee	Understanding and manipulating microglia/macrophage activity following intracerebral hemorrhage to confer neuroprotection	Heart & Stroke Foundation of Canada	\$114,000

Publications

Neurology

Publications for the period July 1, 2013 to June 30, 2014

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Alanazy M, **White C, Korngut L**. Diagnostic yield and cost-effectiveness of investigations in patients presenting with isolated lower motor neuron signs. *Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration* 2014 May 27;1-6.

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Almekhlafi MA, Desai J, Nambiar V, Mishra S, Volny O, Eesa M, **Demchuk AM, Menon BK**, Goyal M. Imaging-to-Stent deployment Time interval is Shorter During Daytime Hours' Vs. Evening Times in Endovascular Therapy for Acute ischemic Stroke.

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Asdaghi N, **Hill MD**, Coulter JI, Butcher KS, Modi J, Qazi A, Goyal M, **Demchuk AM, Coutts SB**. Perfusion MR predicts outcome in high-risk transient ischemic attack/minor stroke: a derivation-validation study. *Stroke*. 2013 Sep 03;44(9):2486-92.

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Blacquiere D, **Demchuk A**, al-Hazzaa M, Lum C, Rodriguez-Luna D, Molina C, Silva Blas Y, Dzialowski I, Czlonkowska A, Boulanger JM, Gubitz G, Padma V, Bhatia R, Roy J, Kase C, **Hill M**, Aviv R, Dowlatshahi D. Association of Fluid Levels, Density Heterogeneity and Irregular Margins on Baseline Non-Contrast Computerized Tomography With Significant Hematoma Expansion in Intracerebral Hemorrhage.

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Burton JM, **Costello F.** Does this optic neuritis patient have neuromyelitis optica? An approach to optic neuritis in the context of neuromyelitis optica. *Expert Rev Ophthalmol* June 2014;9(3): 205-216 (doi: 10.1586/17469899.2014.922874)

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Cairncross JG, Wang M, Jenkins RB, Shaw EG, Giannini C, Brachman DG, Buckner JC, Fink KL, Souhami L, Laperriere NJ, Huse JT, Mehta MP, Curran WJ Jr. Benefit from procarbazine, lomustine, and vincristine in oligodendroglial tumors is associated with mutation of IDH. *J Clin Oncol.* 2014 Mar 12;32(8):783-90.

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Neurology (cont'd)

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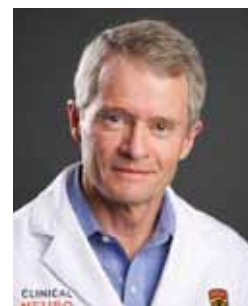
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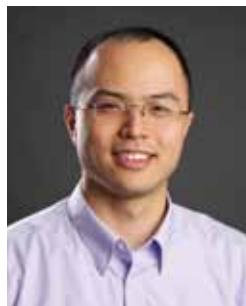
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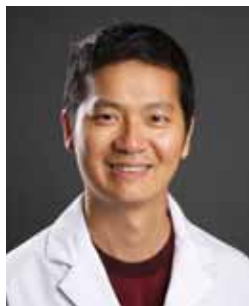
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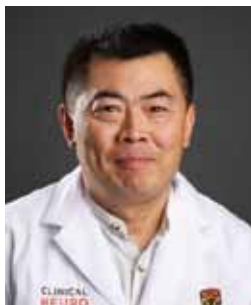
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