CNS Newsletter

WELCOME:

ARTICLES:

PAST AND UPCOMING EVENTS:

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Letter from the Editor

Dear CNS Members,

Happy New Year! Wishing you and your family a happy and healthy 2023!

In this newsletter:

- We take a closer look at the excellent clinical and research accomplishments of Dr K. Davis and Dr Z. Kiss.
- We would like to introduce you to our Trainee CNS Board Member. Welcome Dr Himanshu Gupta!
- In collaboration with the Canadian Pain Society (CPS), CNS is organizing a high-quality Interventional Pain Procedure and Neuromodulation Hands-on workshop on May 8-9, just before the start of the Annual CPS meeting. More information in the newsletter!

Please note our upcoming 15th Canadian Neuromodulation Society Annual Meeting on **September 21-23, 2023** in exciting Niagara-on-the-Lake, Ontario.
You will find more information about conference, venue and abstract submission in this newsletter.

Dr. Yasmine Hoydonckx MD MSc FIPP
Editor – Newsletter, CNS

President's message

Dear Members of the Canadian Neuromodulation Society

The holiday season is a time to reflect on all that has been accomplished in the past year and setting our goals for the new year. 2022 was a great year for the CNS and I would like to thank everyone on the board, our members, and our sponsors for helping to put together a very colourful and scientifically superb meeting in St John's, Newfoundland in June. A big shout out to all of you who became honorary newfoundlanders! A number of us also had a wonderful opportunity to attend the INS meeting in Barcelona and we have made great strides in collaborating with our colleagues in NSUKI for journal club and also in coordinating a combined meeting in Niagara-on-the-Lake for September 2023. I look forward to seeing members from both societies in one of Canada's most beautiful and bountiful regions.

I would also like to acknowledge the work done to coordinate an educational program specific to neuromodulation at the Canadian Pain Society annual meeting in May 2023 in Calgary and Banff. The lab promises to be a great opportunity to raise the profile of neuromodulation in Canada.

Going forward, I look forward to working with all of you in 2023 to develop a national registry for neuromodulation. We have a unique opportunity to leverage an already existing platform and once implemented, we hope it will help improve access to neuromodulation in underserved regions.

On behalf of the CNS I want to wish you all a Happy New Year and I sincerely look forward to seeing you all in 2023.

Dr. Keith MacDougall, MD FRCSC
President

"My Lab"

Acute and Chronic Pain Research

Prof. Karen Davis

Pain is a major public health issue that affects an estimated 12 million Canadians—more than heart disease, cancer and diabetes combined. Chronic pain can be extremely difficult to treat and costs over $43 billion annually in Canada. Targeted treatments, such as neurosurgical ablation and neuromodulation therapies, are effective for only a minority of patients, so there is an urgent need for personalized therapies that are tailored to individual patients. Because each person experiences and copes with pain differently, a deep understanding of individual variability in the mechanisms underlying pain and its modulation is needed to develop personalized treatments. My research lab seeks to characterize individual neural circuits and processes that underpin pain and its modulation.

My research program is focused on developing models of brain structure and function related to pain and its modulation in healthy individuals and those with chronic pain and identifying brain and behavioural biomarkers to predict treatment outcomes across chronic pain conditions**.** To do this we collaborate with clinician-scientists in neurosurgery, plastic surgery, anesthesiology, neurology, and rheumatology (including Drs., Mojgan Hodaie, Dimitri Anastakis, Mojgan Hodaie, Robert Inman). We also collaborate with neuroethicist Daniel Buchman to examine stigma and the neuroethical issues associated with using brain imaging biomarkers to address the challenges of translating research advancements to patient care.

Our framework is our concept called the dynamic pain connectome (DPC), which comprises the spatiotemporal signature of neural communication that represents the cognitive, affective and sensorimotor aspects of pain and their interactions. The DPC is comprised of brain networks that operate at specific times to govern pain sensitivity and modulation, and the ability to perform cognitive and attention tasks while in pain. The DPC includes the salience and default mode networks, the descending pain modulation pathway and the ascending nociceptive pathway. The DPC arose from our lab discoveries of behavioural phenotypes and related neural circuits based on how an individual prioritizes pain relative to competing attentional demands. The DPC allows us to examine how and why pain interferes with one's ability to focus on attention-demanding tasks and activities of daily living, or conversely for some people, how engagement in a task can serve as a distraction from pain.

Karen D. Davis, Ph.D., FCAHS, FRSC
Canada Research Chair in Acute and Chronic Pain Research
Professor, Department of Surgery and Institute of Medical Science, University of Toronto
Head and Senior Scientist, Division of Brain, Imaging and Behaviour, Krembil Brain Institute, University Health Network
Editor-in-Chief, PAIN

"My Program"

Prof. Zelma Kiss

We must learn from every one of our patients – that is clinical research

I established the Therapeutic Brain Stimulation and Research lab at the University of Calgary in the early 2000s. At that time, I was most interested in learning the mechanisms whereby deep brain stimulation (DBS) worked to treat movement disorders and this theme has been an ongoing driving force in our research program. We have also expanded to a number of related foci, including development of neural prostheses, electrophysiology of disease, ethics of neurotechnologies, and, of course, clinical trials for new indications amenable to treatment with neuromodulation.

For most of us, our careers are about timing and mentors. I was tremendously lucky to have started my PhD with Dr. Ron Tasker. I had enjoyed working with him as a resident on the neurosurgery service, and his philosophy of learning something from every patient he encountered, in the clinic or the operating room, was one of the biggest influences on me. He used a pain questionnaire when he first started practice in 1961, before anyone had heard of the idea of standardized assessment. The other principle he taught was to be as minimally invasive as possible in patients with chronic pain. Unfortunately, this seems to have been lost on many recently in the pain neuromodulation field.

My first summer in the Tasker/Dostrovsky lab at the University of Toronto, I spent my time reading papers to figure out what I wanted to do in the lab, going to the OR to learn about single cell recordings, seeing what we can learn from patients undergoing thalamotomy for tremor or DBS for pain. I developed a research project based on thalamic recordings. Within a year, the old pallidotomy operation, was resurrected, when Laitinen re-examined Leksell's Parkinson disease (PD) patients. Shortly thereafter, Benabid reported on DBS in thalamus for tremor and subthalamic nucleus (STN) for PD. This completely revolutionized the treatment of all movement disorders and led me to my fellowship training with him in Grenoble, France.

When I returned to Canada in 1998, I started my first appointment at the University of Ottawa where I met my next mentors, Bin Hu and Leo Renaud, both neuroscientists from whom I learned intracellular recording in rodent brain slices and with whom I published our first papers on the cellular mechanisms of DBS (*Neurosci* 2002). They were tremendously helpful in my applications to achieve a CIHR clinician scientist award which provided 12 years of salary support, protecting my research time. Later salary support from the Alberta Heritage Foundation for Medical Research provided another 13 years of protection in addition to operating funds.

With a talented group of grad students and post-docs, we established the cellular mechanisms of how DBS affects thalamocortical neurons, relating human microelectrode recordings to observations in rat brain slice. We described the role of glutamatergic depletion in the pathway stimulated in thalamus and motor cortex (*J Physiol* 2004, *J Neurosci* 2006, *J Neurophysiol* 2006). Subsequently, we focused on longer-term network mechanisms of DBS (*PLoS One* 2014) and defined a role for cholinergic pathways in the globus pallidus and infralimbic cortex (*J Neurophysiol* 2016, *J Neurosci* 2018, *Eur Neuropsychopharmacol* 2021). In collaboration with engineering, we developed a method for using optical imaging to learn the effects of thalamic DBS at the cortical level in rodents (*Neuroimage* 2016, *Brain Stimul* 2020). This collaboration has extended to involve new colleagues and evolved to new targets – now we can apply weeks of DBS in rodent models.

Clinical research has paralleled my lab work. We designed the first CIHR-funded multicentre Canadian trial to study pallidal DBS for cervical dystonia (*Brain* 2007), the first to focus on this subtype. Next, after a pilot study (*J Psychiatr Neurosci* 2013) we performed a clinical trial of DBS for depression (*Lancet Psychiatry* 2020) and have been studying how DBS alters brain network changes to produce improvement. We have used imaging (*J Affect Disord* 2020, *Neuropsychopharmacology* 2020, *Brain Stim* 2020), EEG (*Brain Stim* 2022) and neural network modeling (*Neuroimage* 2022). Another technique we utilize in the lab to understand DBS and the pathophysiology of neurological conditions is TMS, transcranial magnetic stimulation (*J Neurophysiol* 2020, *Clin Neurophysiol* 2021), and intraoperative electrophysiology (*J Neurol Neurosurg Psychiatry* 2014, *Biol Psychiatry* 2016).

In the background, we have been developing electrical stimulation paradigms to mimic natural somatosensory percepts, experiments that require many years of data collection both in the operating room and the lab (*J Neural Eng* 2010 and 2018, *IEEE Trans Neural Syst Rehabil Eng* 2011). A new area of research involves focused ultrasound (FUS) for lesioning and neuromodulation. We are using brain slices to learn how FUS can change neuronal activity, in parallel with both low- and high-intensity FUS in patients (*Med Phys* 2019, *Parkinsonism Relat Disord* 2020).

And finally, I am collaborating with Neuroethicists at UBC on an entirely different type of research, analyzing neurotechnology patents. This collaboration started serendipitously when Judy Illes and I were skiing in the backcountry for 3 days and discovered this common interest. We co-supervised a summer student from Dalhousie law school, who wrote 2 papers on his work (*Nature Biotechnology* 2017, *Neuromodulation* 2019). This collaboration continues and we now hold a co-funded CIHR / European Neuroscience grant with legal scholars in Bonn Germany.

The most exciting thing about research in neuromodulation is not only that it has blossomed over the past several decades, but that there are so many avenues to pursue. We cannot even guess at all the things we might be doing down the road. However, only by using solid research methods, will we advance the field in a rigorous and principled fashion.

Zelma Kiss, MD PhD FRCSC
Professor of Neurosurgery, Department of Clinical Neurosciences
Hotchkiss Brain Institute
Cumming School of Medicine

New addition to CNS Board:
Dr Himanshu Gupta MD

Dr. Himanshu Gupta is a PGY4 Neurology resident at McMaster University with an interest in pain medicine and neuromodulation. He completed his medical school at McMaster University, and subsequently entered his Adult Neurology residency at McMaster University. Here he was selected as Chief Resident and has an interest in pursuing a career in pain medicine. He looks forward to being able to contribute to the community in the future through research and educational pursuits, as well as bringing the trainee perspective to the CNS. He has been elected as a Trainee CNS Board Member and will be involved in the CNS Newsletter and CNS Journal Clubs.

Welcome Dr Gupta!

Upcoming workshop: CNS-CPS Interventional Pain Procedure and Neuromodulation Hands-on Workshop

Date: **May 8th and May 9th, 2023**.
This workshop will precede the Canadian Pain Society (CPS) Annual Scientific Meeting which is scheduled on May 10-12, 2023 in Banff, Alberta.
Location: Advanced Technical Skills Simulation Laboratory (ATSSL), Calgary, Alberta
Organizing committee: Anuj Bhatia (Chair), Keith MacDougall, John Pereira, Harsha Shanthanna, Kelly Shinkaruk
Faculty for the workshop: Anuj Bhatia, John Hanlon, Keith MacDougall, Nimish Mittal, Harsha Shanthanna

Day 1 (May 8 2023: 1000-1700): Lectures on interventional and neuromodulation procedures for relieving pain

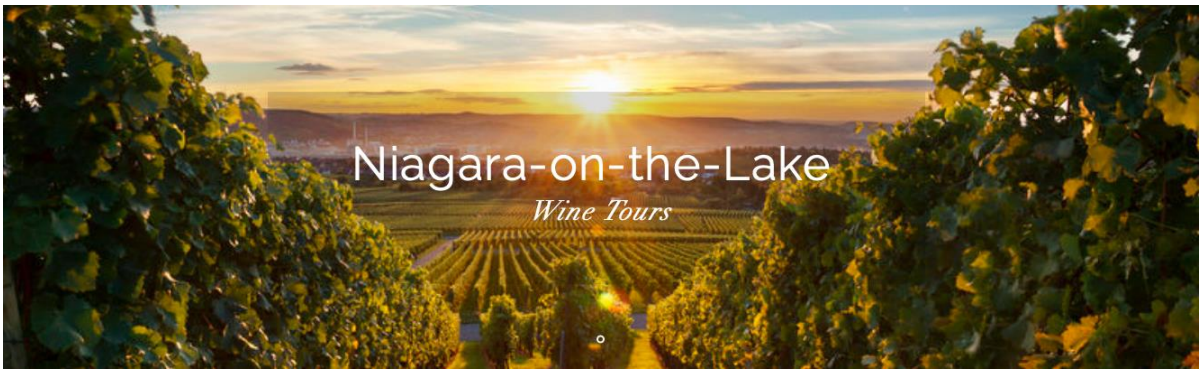
1. Principles of x-ray and US use for pain procedures (John Hanlon)
2. Neuromodulation for pain – Indications and selecting modalities (Keith MacDougall)
3. Neuromodulation for pain – SCS and SNS trials (Anuj Bhatia)
4. Lumbar spine and SIJ RF ablation procedures (Harsha Shanthanna)
5. Major joint injections and denervation (Nimish Mittal)

Day 2 (May 9, 2023: 0800-1700): Cadaveric procedure (4) and live volunteer (1) scanning stations

1. X-ray cadaver station: SCS trial, tunneling, and IPG implant (Keith MacDougall, Anuj Bhatia)
2. US live volunteer station: Common peripheral nerve blocks – intercostal, stellate ganglion, ilioinguinal and iliohypogastric nerves, erector spinae plane (John Hanlon)
3. US cadaver station: Major joint denervation – hip, knee, shoulder (Nimish Mittal)
4. X-ray cadaver station: Lumbar spine and SIJ RF ablation procedures (Harsha Shanthanna)
5. US cadaver station: Common peripheral nerve blocks and PNS trials (Anuj Bhatia)

Registration fee:
Practicing physicians: $1500
Fellows/Residents: $750
Please express your interest in attending this event by e-mailing Victoria Bains (CNS administrator): Victoria.Bains@uhn.ca

Upcoming CNS Meeting: ***September 21-23 2023, Niagara-on-the-Lake***



Please join us for the 15th Canadian Neuromodulation Society Annual Meeting **September 21-23, 2023** in Niagara-on-the-Lake, Ontario.

We have created an exciting and diverse program that we are delighted to share with our members.

Location of the event: Queens Landing

Registration will be opening soon!

Lodging: Hotel Queens Landing Hotel: Book your room at CNS conference rate starting at $309.

Abstract submission

The CNS will offer 1250 CAD and free registration for the meeting to the 10 best abstracts submitted by research and clinical trainees and to the 5 best abstracts submitted by allied health staff (nurses, psychologists, physical therapists and others)

Please submit your abstract to the Scientific Committee via email to victoria.bains@uhn.ca **by July 31, 2023.**

Abstracts should be structured in four parts: Introduction, Methods, Results, and Conclusions (max 2000 characters).

For further information, please visit https://neuromodulation.ca.

Calendar of upcoming Neuromodulation events

2023-2024

- ***August 12-13 2023****: NSANZ 2023: 16th Annual Scientific Meeting. Brisbane, Australia*
- ***August 18-22 2023****: 5th International Brain Stimulation Conference. Lisbon, Portugal*
- ***August 31-September 2 2023****: 3rd Joint Congress of INS European Chapters. Hamburg, Germany*
- ***September 20-22 2023****: 13th Congress of European Pain Federation (EFIC). Budapest, Hungary*
- ***September 21-23 2023****: 15th Annual meeting of the Canadian Neuromodulation Society. Niagara-on-the-Lake, Canada*
- ***May 11-16 2024****: International Neuromodulation Society 16th World Congress. Vancouver, Canada*

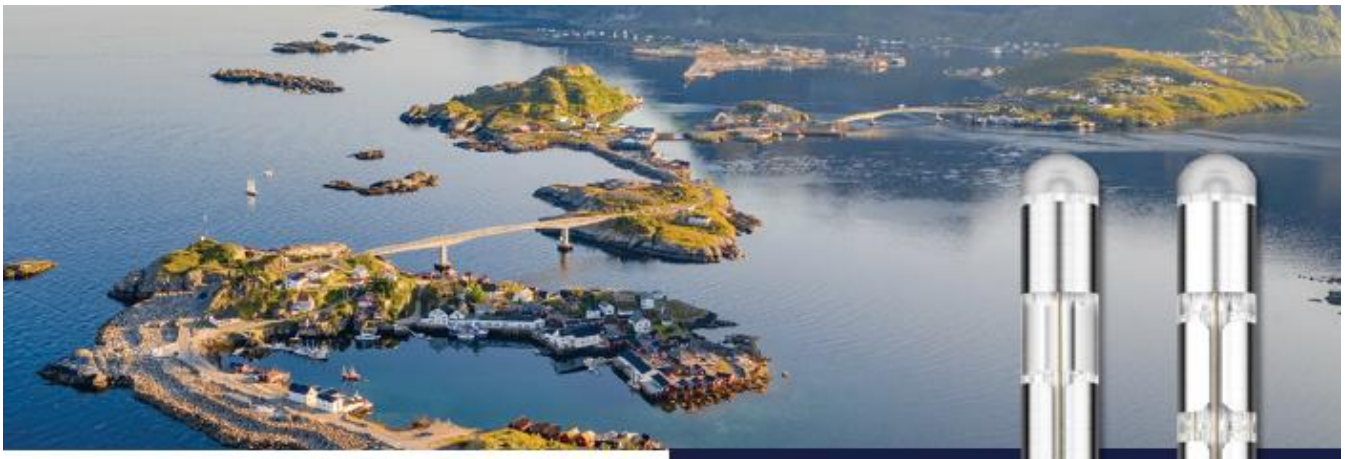
By the way ….

To make this newsletter happen, we would like to have your input!

You can send us your work/advancements/experience on the following topics:

- **What's out there?**: Short reviews of recent advances on neuromodulation topics
- **This is how I do it**: Share with us your tips and tricks for performing neuromodulation procedures
- **My clinic/program**: Brief report on the unique features of your neuromodulation clinic/program
- **My lab**: Brief report on your neuromodulation research set-up
- **Never too late to learn**: Any educational event that you are organizing including information about upcoming national/international meetings
- **Curious cases**: Interesting case reports from your practice
- **Letter to the Editor**: Response to articles or topics addressed in the CNS newsletter

Please send your contribution to Yasmine.hoydonckx@uhn.ca . Thank you!!



The first-of-its-kind[1] SenSight™ Directional Lead System

The benefits of directionality plus the power of sensing

With your collaboration and insights, we've designed every component of our DBS directional lead system – including the lead, the burr hole device, the extension, and everything in between. It's the only DBS directional lead system with 3T and 1.5T MR Conditional* eligibility.

Built with proprietary materials, components, and processes, the SenSight™ directional lead and Sensight™ Extension work seamlessly with the Percept™ PC Neurostimulator to enhance detection of local field potentials (LFPs), which are 1 million times smaller than DBS stimulation pulses.[2]

Medtronic DBS systems are MR Conditional and safe in the MR environment as long as certain conditions are met. If the conditions are not met, a significant risk is tissue lesions from component heating, especially at the lead electrodes, resulting in serious and permanent injury including coma, paralysis, or death. Refer to the MRI Guidelines for Medtronic Deep Brain Stimulation Systems for a complete list of conditions: http://www.medtronic.com/manuals

* Products that appear on this web site may not all be licensed in accordance with Canadian Law.

1. Reference data on file
2. Neumann WJ, Staub F, Horn A, et al. Deep brain recordings using an implanted pulse generator in Parkinson's disease. *Neuromodulation*. 2016;19(1):20–24.

Medtronic

Abbott

News Release

ABBOTT INTRODUCES CANADA'S FIRST REMOTE NEUROMODULATION PATIENT-CARE TECHNOLOGY, NEUROSPHERE™ VIRTUAL CLINIC, TO TREAT PEOPLE WITH CHRONIC PAIN AND MOVEMENT DISORDERS*

The new system allows patients implanted with an Abbott neuromodulation device to communicate with their physician and remotely receive treatment in real time, regardless of location§

MISSISSAUGA, ON, July 26, 2022 — Abbott (NYSE: ABT) announces the Health Canada licencing[5] of NeuroSphere™ Virtual Clinic, a remote programming technology that is the first of its kind in Canada and is compatible with Abbott's suite of neuromodulation technologies. NeuroSphere Virtual Clinic has the potential to increase access to optimal treatment for patients living with chronic pain, Parkinson's disease, or essential tremors who might otherwise have difficulty receiving care from their healthcare provider due to location or being unable to travel to seek care.

Abbott's NeuroSphere Virtual Clinic gives patients the flexibility and comfort of receiving care anywhere§ by connecting with their doctor via secure in-app video chat and an integrated remote programming feature. This feature enables clinicians to prescribe new treatment settings remotely to the patient's neurostimulation device using the clinician programmer app and a new, simple, and secure remote care connection.

In Canada, it is estimated that more than 6 million people live with chronic pain,[1] almost 100,000 people live with Parkinson's disease,[2] and almost 2 million people live with an essential tremor.[3,4] Many of these people who don't live close to a healthcare centre have difficulty accessing care due to the inability to see their doctor in-person. They are often challenged by the time associated with the trip, and/or the availability of a caregiver to help with their travel. In addition to the time implications, patients and caregivers may experience considerable travel-related costs and reduced employment wages. This is particularly true for those living in rural, northern, and remote parts of the country.[5]

Full Press Release & foot notes ...

Contact your local Abbott Neuromodulation representative to start remote programming for your neuromodulation patients

*Neurostimulation systems for DBS are used in patients with levodopa-responsive Parkinson's disease or tremor. Please refer to the device Instructions for Use for details.

§Anywhere with a cellular or Wi-Fi connection and sufficiently charged patient controller.