Canadian IONM News
Official Newsletter of CANM

Contents

Contact Us:
info@canm.ca

Advertising:
canmnewsletter@gmail.com

CANM
CANADIAN ASSOCIATION OF NEUROPHYSIOLOGICAL MONITORING

Message from the President

This letter represents my first message as the President of CANM and to be honest I enter this role with a good measure of trepidation. Nevertheless I could not in good conscience take a back seat within our small professional community when others, who have worked so hard to promote and develop CANM, enthusiastically encouraged me to assume this responsibility. There is still plenty to accomplish and CANM's goals can only be fulfilled with contributions, and feedback, from those in the field. So here I am. While not everyone can, or wants to, sit on committees, assistance is always gratefully appreciated for the various tasks we encounter. The Executive of CANM may at times ask members as well as non-members for assistance. Because the neuromonitoring community in Canada is small we hope that people, both new and experienced, will be willing to pitch-in when approached. If you are not a CANM member please consider joining; we are stronger and more inclusive together. I would also hope that all my colleagues exercise patience with me as I learn to navigate my new role.

My pitching-in plea provides an opportune segue way for an important acknowledgement. A big round of applause is well deserved for Laura Holmes and the CANM symposium organizing team for a top flight job in the planning and execution of the 10th anniversary CANM symposium held in Toronto on September 15 and 16. Of the many highlights of this symposium what particularly struck me was the strong contingent of new faces to the field of IONM. Here were the young people of our profession delivering case presentations, moderating sessions and being actively involved in their career. I always enjoy the company of my more experienced colleagues but the newbies injected me with hope, enthusiasm, and spirit. In keeping with that spirit, the enthusiastically indefatigable, Dr David Houlden, delivered the key note address which was a novel look into the future of IONM. So in many ways, the Toronto symposium had a feel of the "future is now".

IONM continues to be at a crossroads particularly with respect to evidence based performance as well as training and education. This is not unique to Canada, but I am proud to say we have made strides in IONM education through our program in association with the Michener Institute in Toronto. We are pleased that the Michener program has been well attended and graduates as well as current students are now in

IONM positions in hospitals across Canada. As a reminder, CANM members can take individual Michener courses without applying for the graduate certificate which provides an ideal opportunity to upgrade skills and knowledge. Additionally, we continue to provide our webinar series, CANMtalks, which provides current topics of interest to IONM practitioners. We have received both positive and, unfortunately, erroneous negative feedback about our efforts. While we do not consider our work above the realm of criticism, indeed we encourage this, we will continue our vision to provide opportunities for education and training as part of CANM's mandate. This, as always, will incorporate feedback from discussions within the IONM community.

As a final note I had the opportunity to participate in an IONM workshop for anesthesiology residents at the All India Institute of Medical Sciences in New Delhi in October. I was pleased that anesthesiology training embraces the presence of IONM in the operating room and it was a wonderful experience to participate in this workshop. Workshops of this kind could easily be adopted here in Canada and provide an excellent platform for educating surgeons, anesthesiologists and other interested clinical professionals. I owe a debt to my new friends and colleagues in New Delhi for their gracious hospitality and for the opportunity that fertilized the many ideas I obtained from my experience there.

As I start my tenure as CANM president I am both optimistic and anxious; a dichotomy true, but that's how I roll.

We will talk soon.

Yours,

Marshall Wilkinson, BSc (Hon.), MSc, PhD
Neurophysiologist
Section of Neurosurgery
Health Sciences Centre
Winnipeg, MB

CANM Executive Board: Election Update

The CANM Executive Board is pleased to announce that the election process is complete and the following nominees were elected at the Annual General Meeting of members on Saturday September 16, 2017; Jamie Johnston, Laura Holmes, David Houlden, Susan Morris, Francois Roy.

2018 CANM Executive Board

President:	Marshall Wilkinson, BSc (Hons), MSc, PhD
President Elect:	Jamie Johnston, PhD, CNIM
Secretary:	Ekaterina Potapova, BSc, CNIM
Treasurer:	Nancy Lu, BSc (Hons), CNIM
Director:	Laura Holmes, MSc, CNIM
Director:	David Houlden, PhD
Director:	Susan Morris, PhD
Director:	Francois Roy, PhD, CNIM

Thank you to all CANM full members who contributed to this year's election process and we hope you continue to support CANM's mission by renewing your membership in 2018.

CANM invites all health care professionals affiliated with IONM (in Canada and abroad) to visit our website **www.canm.ca** and register with our professional association. Membership provides an opportunity to have your say in CANM initiatives impacting the field of IONM today and in the future.

2018 CANM *Membership Fees*

FULL MEMBER:
$165

ASSOCIATE MEMBER:
$130

INTERNATIONAL MEMBER:
$165

CLICK HERE
to sign up today

Intraoperative Neurophysiological Monitoring Graduate Certificate Program

The Canadian Association of Neurophysiological Monitoring (CANM) and The Michener Institute of Education at UHN have partnered to introduce a one-of-a-kind Intraoperative Neurophysiological Monitoring (IONM) Graduate Certificate Program.

- Prepare for a career in IONM
- Be certification ready

The online program comprises six courses ranging from basic sciences to advanced topics in IONM.

1	Clinical Sciences for IONM	SEP - DEC	4	IONM Modalities II	SEP - DEC
2	Basic Principles of IONM	JAN - APR	5	Considerations for IONM	JAN - APR
3	IONM Modalities I	MAY - AUG	6	Advanced Topics in IONM	MAY - AUG

For program details and admission requirements visit **MICHENER.CA/CE/IONM**

CANM thanks Medtronic of Canada for their generous support of this education

THE Michener INSTITUTE of Education at UHN®

UHN

CANM CANADIAN ASSOCIATION OF NEUROPHYSIOLOGICAL MONITORING

222 St. Patrick Street | Toronto, Ontario | M5T 1V4 | **MICHENER.CA**

CANM Celebrates 10 Years!

CANM proudly celebrated the 10th anniversary of its annual symposium in Toronto on September 15th and 16th, 2017. This milestone event boasted an excellent line-up of speakers that covered a wide range of topics of interest to the intraoperative neurophysiological monitoring community.

Since spine surgery is the largest application for IONM in Canada, it was fitting to have the symposium begin with the topic of spinal deformity. As an opening presentation, Dr. Stephen Lewis, an orthopedic spine surgeon at Toronto Western Hospital and SickKids, gave an excellent overview of intraoperative alerts and a surgeon's perspective on how to effectively manage them. To complement, Dr. Christian Zaarour, a pediatric anesthesiologist at SickKids, spoke about the challenges involved in managing patients undergoing complex spinal deformity surgery. Dr. Brian Ciruna, a research scientist with University of Toronto, then described his ground-breaking research into the etiology of adolescent idiopathic scoliosis using a zebra fish model. Spinal surgery was also the focus of William Nantau's presentation which explored a series of interesting cases. Dr. Jay Shils, past-president of ASNM, presented his original research on spinal cord stimulator placement in anesthetized patients using intraoperative neurophysiogical techniques.

The next segment focused on improving the practice of IONM. Dr. Elaine Ng, Clinical Director of Simulation for University of Toronto Anesthesia, provided some valuable insights into the merits of using simulation in the training of medical professionals. A particular highlight was the lecture by Dr. Trey Coffey, Medical Officer for Safety at SickKids, who offered helpful tips on how to improve safety in the operating room, with a focus on how to communicate effectively.

This was followed by Joshua Mergos, IOM program director at the University of Michigan, who detailed his experiences in developing and running the IONM educational program at that institution and spoke about the importance of why an IONM career must begin with scholarship. Evidence for IONM was the foundation for Dr. Jonathan Norton's lecture which provided a critical review of the current literature and encouraged IONM professionals to help advance the available knowledge.

The symposium also offered many lectures with an emphasis on technique. Brett Netherton, CEO of Signal Gear, gave a lively and well-received review of the principles of electrical stimulation in IONM. Dr. George Ibrahim, a Neurosurgeon from SickKids, provided an overview of anatomy and surgery for tumors of the posterior fossa and spoke about how essential the IONM feedback is for resection. Techniques for mapping of the spinal cord were shared by Dr. Mirela Simon, Associate Professor of Neurology from Boston and Dr. Francois Roy, Neurophysiologist from University of Alberta, introduced a novel technique for subcortical mapping using an electrified tip for ultrasonic aspirators. The work of refining flash VEPs for intraoperative applications was shared by Dr. David Houlden, Neurophysiologist from The Ottawa Hospital.

Dr. Houlden also delivered this year's keynote address, an insightful look to the future of IONM, after which he was honoured as the inaugural recipient of the CANM Award of Excellence. Dr. Houlden was

CANM Celebrates 10 Years!

Some of the many attendees at the 10th Annual CANM IONM Symposium.
Photo credit: Dr. Gary Simon

the natural choice for this award and for keynote lecturer for the 10th anniversary meeting, as he is the Founding President of CANM and has contributed so much to our association and to IONM in Canada over the years.

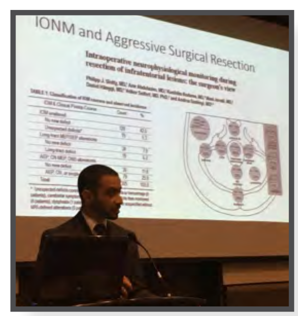
As usual, the case presentations and interactive case conundrums sections of the symposium were a phenomenal success, and the symposium committee would like to thank all those who participated. Presenters shared experiences in cerebral aneurysm, carotid endarterectomy, closed reduction of cervical spine, and embolization with balloon test occlusion, as well as having confidence in IONM results, factors that negatively affect results, positioning injuries, unexpected changes during closure, and MEP monitoring in infants.

The symposium also offered opportunities for networking with colleagues and introductions of those new to the field. We were fortunate to have nine current students or graduates of the Michener program in our midst, along with attendees from Chile, Mexico, and the US.

Brett Netherton explains signal speed.
Photo credit: Laura Holmes

Attendees had the distinct privilege to be the first to hear about the revised CINP proposal, and participate in a roundtable discussion and mock examination.

Planning a symposium is no small feat, so I would like to acknowledge the leadership of Laura Holmes, Chair of the Symposium Planning Committee, and all of the hard work by Michael Vandenberk, Peter Heyboer, Susan Morris, Ekaterina Potapova, Godwin Anthonipillai, Jamie Johnston, and Gilaad Levy to execute this landmark event. Together, we would like to thank all our corporate sponsors, whose support is always appreciated. Finally, on behalf of the Symposium Planning Committee and CANM Executive Board I would like to extend my gratitude to all the attendees who make every symposium a very lively and passionate event. I hope to see you all next year in Calgary.



Dr. Ibrahim explains how IONM guides surgical resection of tumors.
Photo credit: Laura Holmes

Sincerely,

Ekaterina Potapova, BSc, CNIM
2017 Symposium Planning Committee
Secretary, CANM Executive


2018
CANM IONM
Symposium
Calgary, Alberta
Fall
Details Coming Soon..
TEATRO

2017 CANM *talks*

The final CANM *talks* webinar for 2017 was held on October 18, 2017 and CANM was thrilled to have Dr. Stanley Skinner, Director of Intraoperative and Clinical Neurophysiology at Abbott Northwestern Hospital in Minneapolis, MN present ***"How to Use Bulbocavernosus Reflex Testing during Thoracic and Lower Spine Surgery".*** Dr. Skinner spoke at length about the technical use and effective application of the Bulbocavernosus Reflex (BCR) for preventing injury to the lower sacral nerve roots and testing for spinal shock. This is an often overlooked method of monitoring sacral nerves in the thoracic and lower spine surgeries. A prevailing concern for using BCR is how difficult it is to elicit and Dr. Skinner addressed this concern by showcasing his technique of multi-pulse stimulations. The result has been good, consistent and robust signals in diverse patient population. While it is hard to provide a prognosis once an intraoperative BCR change has occurred, this is an area that warrants further investigation and research, especially in regards to post-surgical outcomes.

CANM *talks* is an Accredited Group Learning Activity (Section 1) by the Royal College of Physicians and Surgeons of Canada, approved for 1.5 Section 1 credit. CANM *talks* webinars are open to all interested parties, however space is limited for each session and priority registration is given to CANM members. Become a CANM member today and you'll also get access to videos of past CANM *talks* on the Intraoperative Neurophysiology Discussion Board at: http://canm.proboards.com/

For further information on CANM *talks* or to become a CANM member, please visit: www.canm.ca

Sincerely,

Nancy Lu, BSc. (Hons), CNIM
Treasurer, CANM Executive Board
Toronto Western Hospital, University Health Network
Toronto, Ontario

More CANM *talks* coming in 2018!

Did you know?

Members have access to all previous CANM *talks* webinars

Have an idea for a future webinar topic?

Send us your suggestion to info@canm.ca

Suggested Changes to CERTIFIED INTRAOPERATIVE NEUROPHYSIOLOGY PRACTITIONER (CINP) PROPOSAL

The original proposed pathway leading to the CINP designation has been altered based on survey results from Canadian IONM professionals and direct feedback from our CANM membership. The executive team and education committee have developed a NEW proposed pathway that was presented at the 2017 CANM IONM Symposium. For those of you who did not attend the symposium, I will highlight the changes below and try to explain the rationale behind them. The new proposal will also be distributed to all CANM members via email and will be posted on our website (**www.canm.ca**) for thorough review before a ratification vote is called. There is still ample opportunity to make changes to the proposed CINP pathway and please be sure to contact CANM with any suggested changes, questions or concerns you might have (**email: info@canm.ca**).

PROPOSED GRANDFATHERED PATHWAY CHANGES

One of the major concerns that currently practicing IONM professionals expressed about our original pathway was the case breakdown: 25 spine, 25 brain, 25 brainstem, 25 vascular type cases were mandatory in the 300 independent cases required for exam eligibility. However, one of the realities in our profession is that not every IONM professional has opportunity to monitor all types of cases and some are restricted to monitoring spine cases alone. As a result, many practicing individuals felt the case breakdown put them at an unfair disadvantage and essentially disqualified them from exam eligibility. There were some discussions about how to support these individuals and provide them with either direct or indirect access to cases where they lacked experience: instructional webinars, peer mentoring, visits to hospitals monitoring these cases etc. Although these are fine ideas, they may not be realistic options for everyone. By eliminating the case breakdown requirement for grandfathered individuals, we are removing a major barrier to exam eligibility and hopefully this will mean that more CANM members challenge the CINP exam. It is important to note that all new IONM practitioners will be required to fulfill the case breakdown requirement as initially presented and it will be up to the individual to ensure they gain the appropriate experience during their practical training or through their employment.

Another point of contention in the original CINP pathway was the need to maintain Full (or Associate until eligible for Full) membership in CANM. Some individuals felt that this was inappropriate requirement and that CANM membership should be a choice and a decision made by the individual regardless of their decision to pursue the CINP designation or not.

Suggested Changes to CERTIFIED INTRAOPERATIVE NEUROPHYSIOLOGY PRACTITIONER (CINP) PROPOSAL

PROPOSED CHANGES FOR NEW IONM PRACTITIONERS

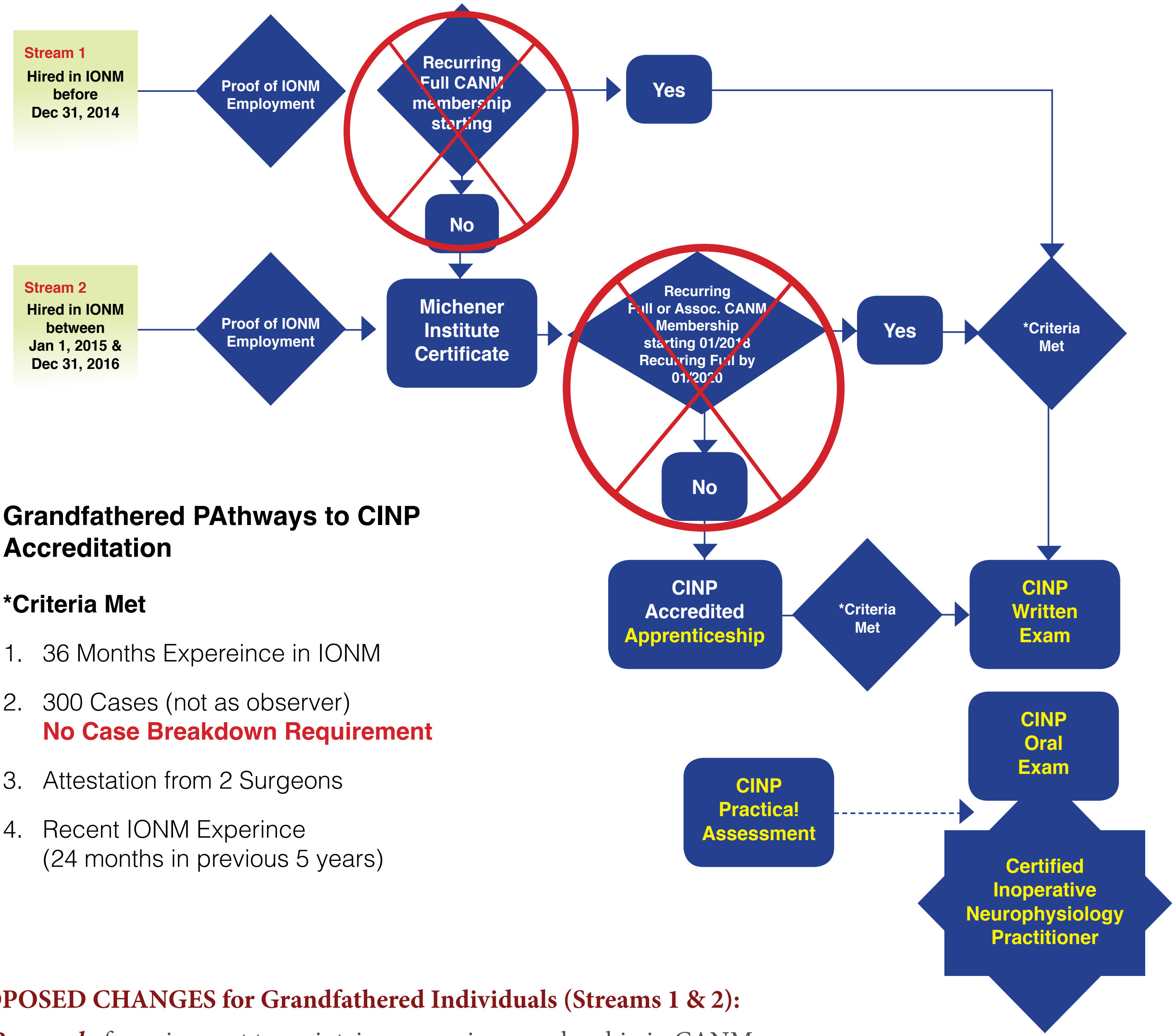
In the original CINP pathway proposal, streams 4 and 5 were required to complete a (not yet created) internship. The development of an internship program is extremely complicated and onerous for any profession and especially so for a very small one such as IONM. There are few (if any) centres in Canada with sufficient case volume, personnel power and institutional supports to reasonably house an IONM internship program. CANM has been facing this challenge for some time and attempting to find a solution to the critical need for Michener students to gain 'hands on' practical experience to complement their didactic learning. One interim solution is to keep on the same path that has naturally evolved over the years i.e. *apprenticeships*. Most IONM practitioners working today gained their practical experience through an employer via an apprenticeship-style experience. In fact, many Michener students have secured employment before completing the program and are gaining practical experience in the same way as their predecessors. For the foreseeable future, and until we can until we can create official internships that are not tied to employment, it makes sense to continue in this vein but perhaps improve on it by imposing a degree of formalization on the apprenticeship model. It has been proposed that CANM develop apprenticeship guidelines to introduce structure and ensure acquisition of key skills and a REPORT CARD to clearly state the kinds of cases and experiences that were gained during the apprenticeship period. It is not a perfect system but it is a good start and an interim solution to a concerning issue that demands attention.

Below is a pictorial summary of what I have outlined above. Again, it is important to note that we are still in the proposal stage and what is presented here is not set in stone. The CANM leadership is listening carefully to our membership and responding accordingly. The changes to the proposed CINP pathway are evidence of this and we invite you to continue to provide us with direction via your feedback.

Susan Morris, PhD
Chair, CANM Education Committee

Suggested Changes to CERTIFIED INTRAOPERATIVE NEUROPHYSIOLOGY PRACTITIONER (CINP) Proposal

NEW CINP Pathway Proposal



Grandfathered PAthways to CINP Accreditation

***Criteria Met**

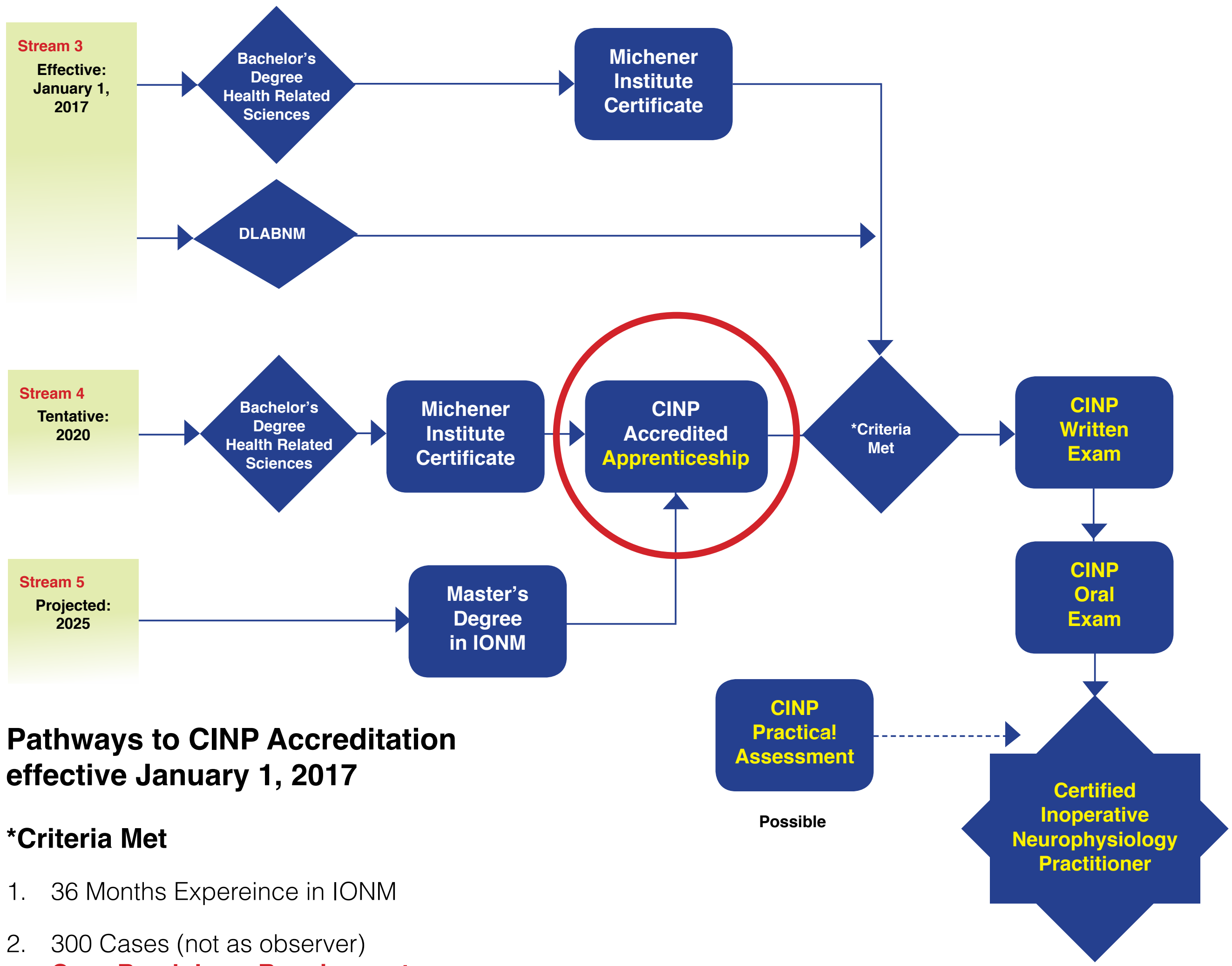
1. 36 Months Expereince in IONM
2. 300 Cases (not as observer)
   No Case Breakdown Requirement
3. Attestation from 2 Surgeons
4. Recent IONM Experince
   (24 months in previous 5 years)

PROPOSED CHANGES for Grandfathered Individuals (Streams 1 & 2):

1. ***Removal*** of requirement to maintain a recurring membership in CANM
2. ***Removal*** of the CASE BREAKDOWN requirement for exam eligibility

Suggested Changes to CERTIFIED INTRAOPERATIVE NEUROPHYSIOLOGY PRACTITIONER (CINP) Proposal

NEW CINP Pathway Proposal



Pathways to CINP Accreditation effective January 1, 2017

*Criteria Met

1. 36 Months Expereince in IONM
2. 300 Cases (not as observer)
   Case Breakdown Requirement
3. Attestation from 2 Surgeons
4. Recent IONM Experince
   (24 months in previous 5 years)

Case Breakdown: of 300 cases needed for credentialing 100 of the cases should fall in the following categories: Spine 25, Brain 25, Brainstem 25, Vascular 25: carotid, aneurysm, TAAA

PROPOSED CHANGE for new IONM Practitioners (Streams 4 & 5):

1. *Change* from internship to apprenticeship

Digitimer

Stimulating Solutions

for Clinical Neurophysiology

DS5 Biphasic Constant Current Stimulator

DS7A/AH Constant Current Stimulator

D185 MultiPulse Cortical Stimulator

D360 8 Channel Isolated Amplifier

D440 2/4 Channel EMG Amplifier

D179 Performance Checker

D175 Electrode Impedance Meter

- Nerve Excitability Testing Hardware & Software
- High Voltage, Constant Current Nerve & Muscle Stimulation
- Intraoperative Monitoring - Motor Evoked Potential Stimulation
- Multi-channel EMG, EEG or EP Isolated Amplification
- Amplifier Performance Checker & Electrode Impedance Meter

Represented in Canada by:

IBIS

IBIS Instrumentation Canada, Inc.
1257 Tintern Drive, Ottawa, ON K4P 1P5
tel: 613-821-3308 fax: 613-821-3314
e-mail: info@ibiscanada.com

We also supply a range of cables, electrodes, gels and other neurodiagnostic accessories - just contact us for details.

Curtailing the stimulus artefact on the D-wave:

A potential trick for Cadwell users

François D. Roy[1,3],*, Kelvin E. Jones[2,3], Aleksandra King[3]

[1]Department of Surgery, [2]Faculty of Kinesiology, Sport and Recreation, University of Alberta

[3]Alberta Health Services, *Corresponding author: Francois.Roy@ahs.ca

D-waves and stimulus tails

Descending motor volleys in the spinal cord, often referred to as D-waves, are useful for monitoring corticospinal tract fibers during spinal cord tumor surgeries (MacDonald et al. 2013). D-wave monitoring involves recording descending neuronal volleys in the spinal cord following high-voltage transcranial stimulation. D-waves are typically recorded using a thin 2-3 contact electrode placed in the epidural space on the caudal edge of the laminectomy. While a D-wave has a small peak-to-peak amplitude of about 60 to 10 μV over the cervical and thoracic spinal cord regions, this voltage is in stark contrast to the high voltages administered during the transcranial stimulation (i.e. 150-350 V). The net result is that the trailing edge of the large stimulus artefact or commonly referred to as the 'tail' can be superimposed on the D-wave. This effect is particularly disruptive when recording from the high cervical spine owing to the minimal separation between the stimulating and recording devices, which is further exacerbated by the inherent short D-wave latency (i.e. < 3 ms; see Fig. 1). One approach to mitigate this effect is to apply a digital filter.

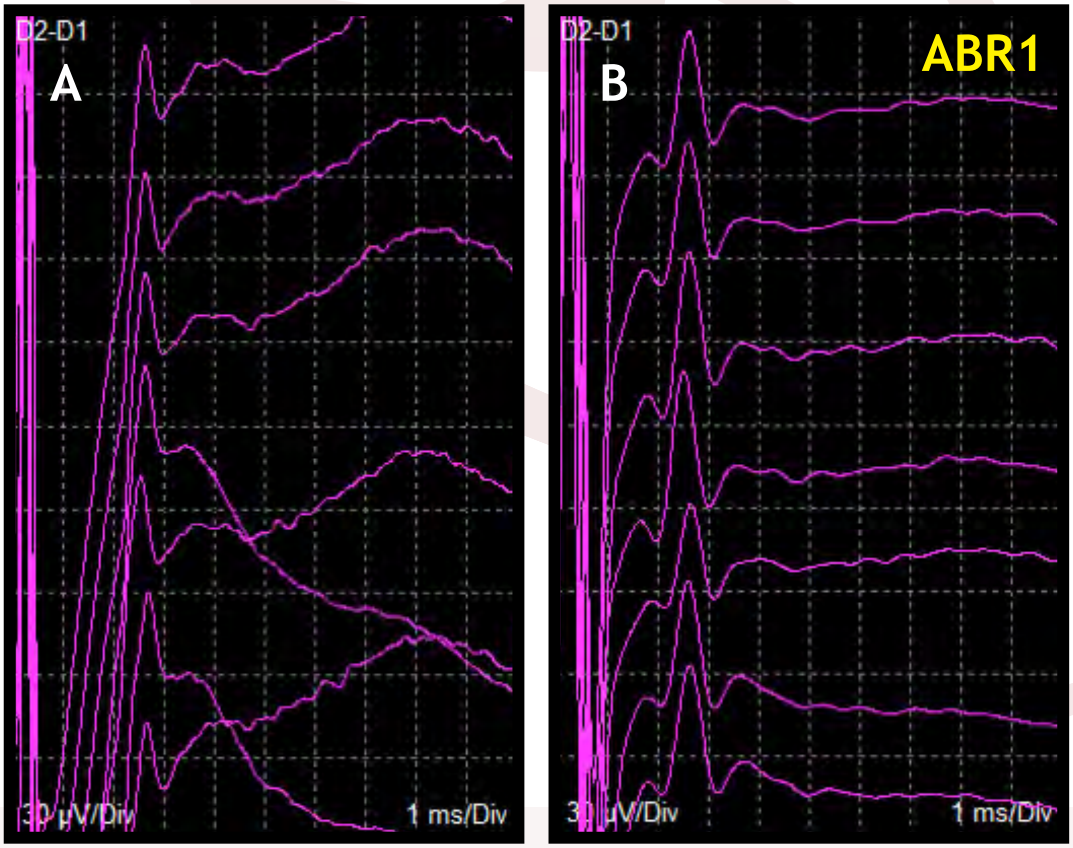


Figure 1.
Large stimulus tail is shown on the D-wave recording **(A)**. Note the substantial enhancement in the amplitude of the D-wave following ABR1 filtering using the Cadwell Cascade Classic software **(B)**. The smaller D-wave shown in the unfiltered recording **(A)** is likely due to the phase cancellation produced by the stimulus tail. Stimuli were delivered at 194 V/438 mA using C1-C2 (i.e. so called "right" D-wave recording) during a foramen magnum meningioma resection.

Curtailing the stimulus artefact on the D-wave:

A potential trick for Cadwell users

Digital filtering

As D-waves have a spectral frequency near 1000 Hz, it is our practice to record D-waves using a 10-3000 Hz bandpass filter. Opening the low-cut filter frequency to 10 Hz allows stimulus artefacts to pass relatively free from distortion; however, this filter also generates a stimulus tail. We have had less success using a higher low-cut filter (such as 20-100 Hz) as this shifts the stimulus artifact rightward onto the D-wave. Nonetheless, high quality D-waves have been shown using low-cut frequencies as high as 500 Hz (see Burke et al. 2000); though these settings are not available on all commercially available IONM systems. To help minimize the stimulus tail, Cadwell Cascade Classic and the Surgical Studio users can apply a reversible digital filter to the recorded traces. The ABR1 filter (also called BAEP1 in the Surgical Studio), which is designed to enhance the 1000 Hz waveforms in the auditory brainstem response (ABR), is particularly well-suited to favour the 1000 Hz frequency (10% of timescale using 1 ms/Div time-base) of the D-wave. For broader and/or more dispersed D-waves, the ABR2 (or BAEP2) may also be suitable given that it favours frequencies near 750 Hz (13% of timescale using 1 ms/Div; see Fig. 2C). Moreover, given that ABR1 is a linear finite-impulse response filter implies that an amplitude criterion, such as a 50% decrease, is unaffected so long as all traces are filtered in the same manner.

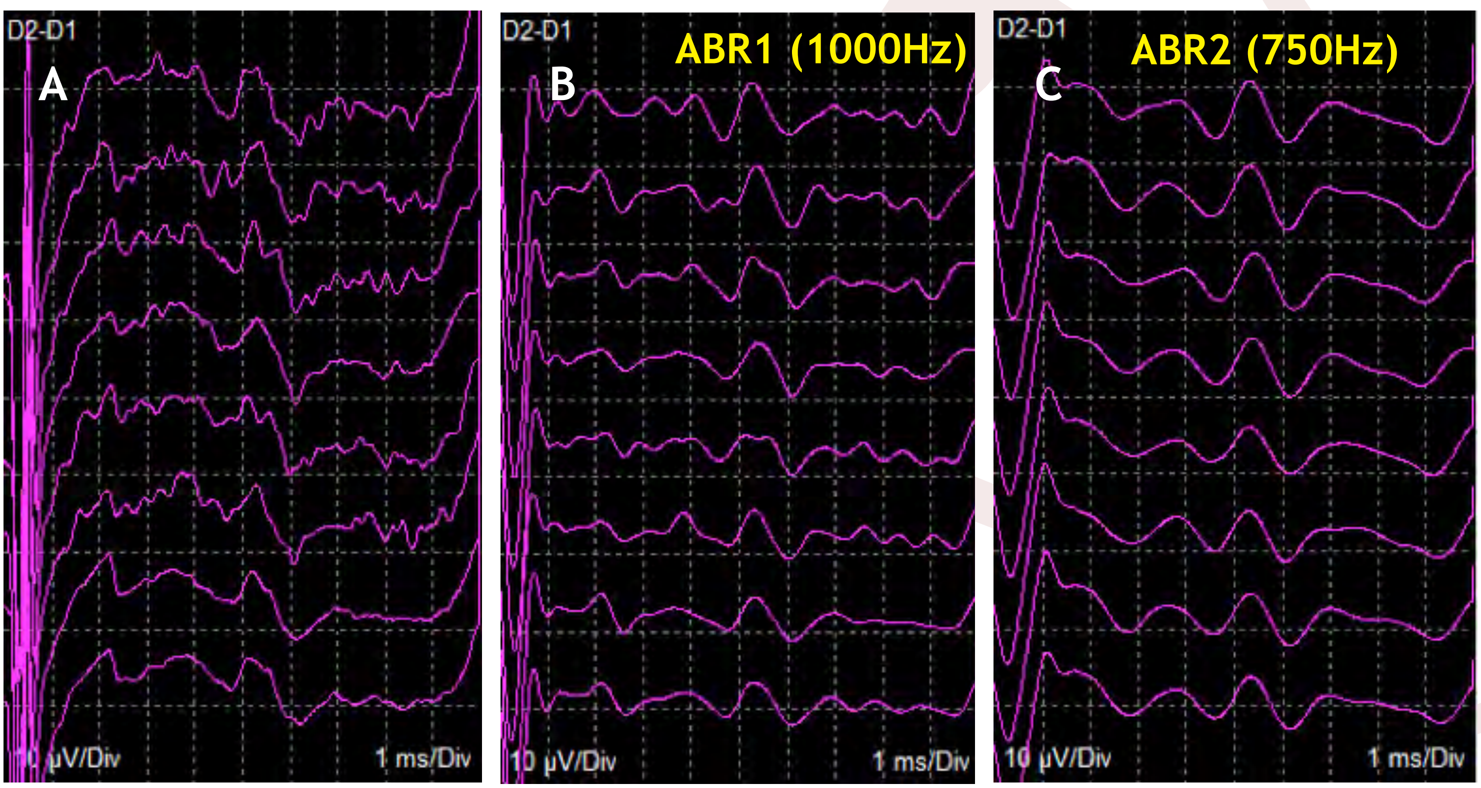


Figure 2. Dispersed D-waves can be better visualized using the ABR2 filter rather than ABR1. D-waves were collected during a C3-T1 intramedullary spinal cord tumor resection. Stimuli were delivered at 348 V/678 mA using C2-C1.

Curtailing the stimulus artefact on the D-wave:

A potential trick for Cadwell users

Figure 3. In some instances, the ABR1 filter will only have a nomimal benefit **(B)**. Data is from the same patient shown in Fig. 2 except that the so-called "right" D-waves were collected with C1-C2 stimulation at 330 V/658 mA. The larger D-wave in Fig. 3 versus Fig 2. could have occurred because the epidural electrode was positioned further on the right side of the cord.

As ABR1 is likely a reverse (or negative phase) filter, the traces should be filtered from right to left. The negative phase implies that the waveforms will have a slightly shorter latency, though this result is somewhat inconsequential during routine IONM. The act of filtering in the leftward direction causes a tail to be produced on the left of the stimulus artefact and away from the coveted D-wave. In more practical terms, this causes attenuation of the stimulus tail and shifts the artefact away from the short-latency D-wave. In some instance, the ABR1 filter can even uncover a D-wave from within a trace where the D-wave could not be clearly monitored **(e.g. compare Fig. 4B vs. 4D)**.

Curtailing the stimulus artefact on the D-wave:

A potential trick for Cadwell users

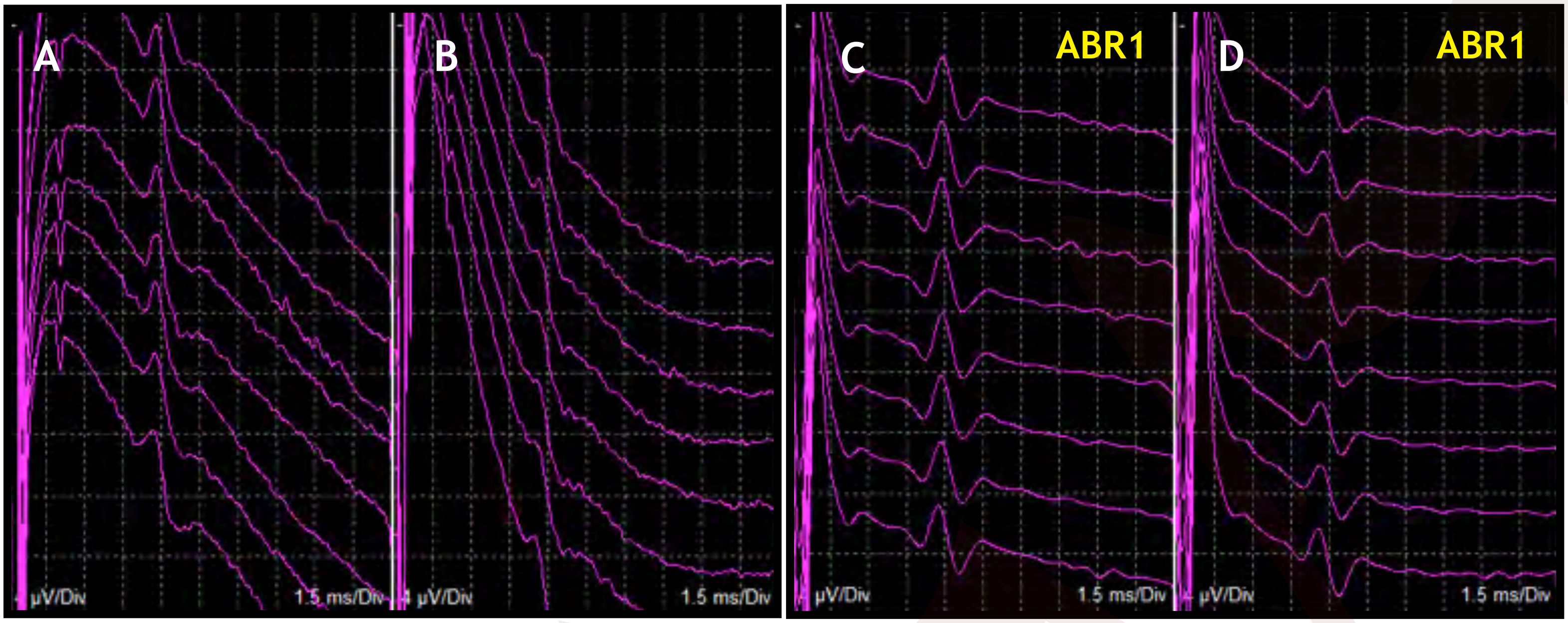


Figure 4. Comparing the effect of the ABR1 filter on the D3-D1 channel (rostral and distal contacts on the 3-lead electrode) versus the D3-D2 channel (rostral and middle contacts). In this instance, the D-wave recording was problematic on the D3-D1 channel **(A)** and not monitorable on the D3-D2 channel **(B)**. Note the substantial improvement of the D-wave on both channels **(C and D)** following ABR1 filtering. Stimulation was provided at 138 v/276 mA using C1-C2 (i.e. so-called "right" D-wave recording).

Conclusion

While the ABR1 filter might not be optimal for every D-wave recording, Cadwell users may wish to try the ABR1 filter in attempt to reduce the effect of the stimulus tail encroaching on the D-wave. It is convenient that these digital filters can be applied on saved data, thereby providing an opportunity to trial the filter prior to applying it during routine IONM.

References

Burke D, Hicks RG, Stephen JP. Corticospinal volleys evoked by anodal and cathodal stimulation of the human motor cortex. *J Physiol 425:283-99, 1990*.

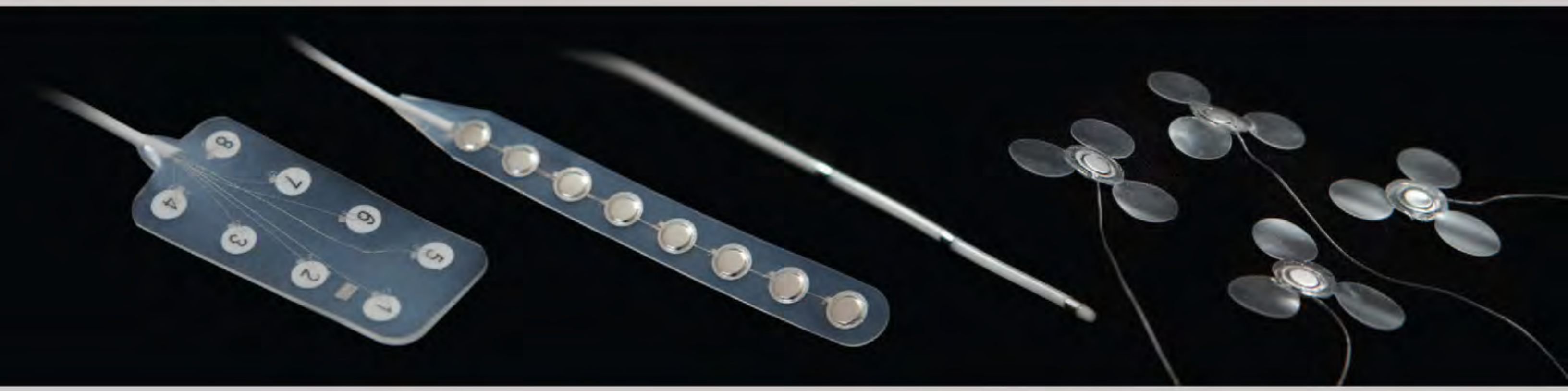
Macdonald DB, Skinner S, Shils J, Yingling C, American Society of Neurophysiological Monitoring. Intraoperative motor evoked potential monitoring - a position statement by the American Society of Neurophysiological Monitoring. *Clin Neurophysiol 124(12):2291-31, 2013*.

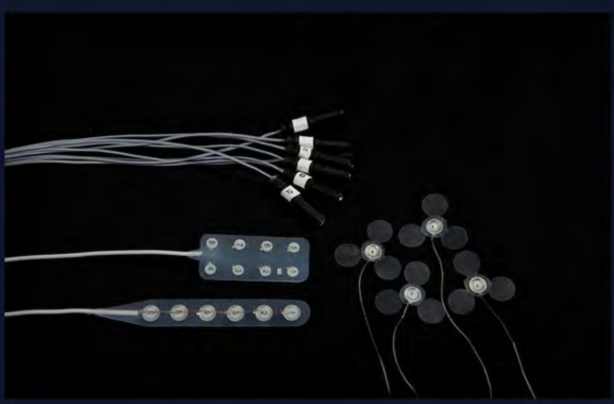
Disclosures

The authors have no conflicts of interest. While this article pertains to the Cadwell system, this only relates to its availability at our institution, but does advocate choosing one IONM system over another.

Click Here to Read Burke

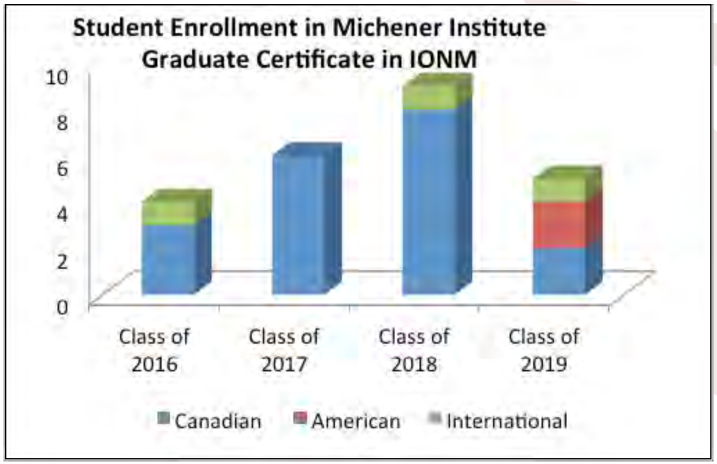
Click Here to Read MacDonald



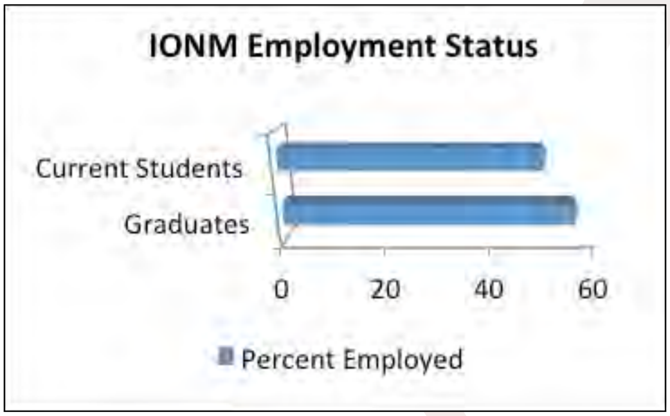


Celebrating the Success
OF THE MICHENER INSTITUTE GRADUATE CERTIFICATE IN INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING

CANM is extremely proud of our demonstrated leadership in intraoperative neurophysiology education and of the uptake of the Michener Institute Graduate Certificate in Intraoperative Neurophysiological Monitoring program. Since 2014, there have been a total of 42 applicants to the Michener Institute Graduate Certificate in IONM program. Offers of admission were made to 29 applicants and a total of 24 students have enrolled in the certificate program to date, 80% of whom are Canadian. Additionally, three CANM members have enrolled in single or multiple courses in the program to support their educational needs.



The program has been a resounding success as evidenced by the number of employers who have actively recruited our students – and in some cases, even before completion of the certificate. Among graduates and currently enrolled students, over 50% have already secured employment in the field of IONM. With the asynchronous online part-time format students are able to successfully complete their studies while working full-time which is a benefit to students and employers alike.



By building a strong foundation, students are well positioned to translate their knowledge into clinical practice when the time arises. Since the program leads the learner through a vast array of topics beginning with basic sciences and progressing to advanced monitoring and mapping techniques, there is an indisputable reduction in the amount of teaching that previously fell either to the employment supervisor or to the trainee as self-directed learning. This allows both the trainee and the supervisor to focus more attention to improving clinical skills and interpretative understanding, which ultimately should lead to an enhanced training experience.

Michener Institute Graduate Certificate

IONM 110	Clinical Sciences for IONM
IONM 120	Basic Principles of IONM
IONM 130	IONM Modalities I
IONM 140	IONM Modalities II
IONM 150	Considerations for IONM
IONM 160	Advanced Topics in IONM

Celebrating the Success OF THE MICHENER INSTITUTE GRADUATE CERTIFICATE IN INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING

Feedback on the program has been overwhelmingly positive. A recent graduate commented "I thoroughly enjoyed the course and am extremely happy to have had exposure to such a broad range of topics relevant to the field of IONM, as taught by leaders in the field". CANM remains committed to continued leadership in the area of intraoperative neurophysiology education and training and is dedicating efforts to both refinement of current offerings and development of novel initiatives.

For more information on the Michener Institute Graduate Certificate in IONM please **Click Here**

Michener Institute Students Attend 10th Annual IONM Symposium!

(left to right): Vlad Dercaci – Class of 2018, Ian Vreugdenhil – Class of 2017, Chris Drummond-Main – Class of 2017, Gilaad Levy – Class of 2019, Peter Heyboer, Mark Uku – Class of 2017. *Not pictured:* Nathaniel Amyot – Class of 2016, Anam Kashif – Class of 2018, Nadia DeAcetis – Class of 2018, Michelle Johnston – applicant Class of 2020**.** *Photo credit:* Dr. Gary Simon

CANM thanks Medtronic of Canada for their generous support of our education initiatives.


Cascade® IOMAX™
MODULAR • COMPREHENSIVE • ROBUST
Innovative IONM solutions
CADWELL
Cascade IOMAX
LCS/VS/AS
H1
H2
H3
H4
H5
H6
H7
H8
H9
TCS
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
E12
E13
1A/1R
2A/2R
3A/3R
CADWELL®
Helping you help others
1-800-361-6991 • info@roxon.ca • www.roxon.ca
ROXON

Did you know...?

Symposium attendees believe **Communication** is the most essential trait for success in this field and they'd describe an IONM professional as **knowledgeable and driven.**

Do you agree?

CLICK HERE to tell us how you'd describe an IONM professional and the essential traits for success

Words to describe an IONM professional and essential traits for success displayed by frequency (increasing font size). Responses collected from symposium attendees on September 15-16, 2017.

"Communication and collaboration in spine neuromonitoring: time to expect more, a lot more, from the neurophysiologists"

Stan Skinner, MD and Francesco Sala, MD
Summary of article appearing in J Neurosurg Spine 27: 1-6, 2017

An increasingly conclusive scholarship demonstrates that intercollegial communication, trust, and collaboration determine the avoidance of medical errors in high-risk patient care settings such as operating rooms. Therefore, enhanced intraoperative communication between peer practitioners (neurophysiologist, surgeon, and anesthesiologist) should produce improved outcomes during intraoperative neuromonitoring (IONM). After an IONM alert, a change in the surgical approach or plan is dependent on credible and coherent neurophysiologist communication of testing results and their meaning. When test interpretation conflicts with the surgeon's expectation, there is no guarantee that the surgeon will intervene. This is true despite good test accuracy for spinal cord injury when, for example, motor evoked potentials are competently recorded. A deferential or distant (remote) neurophysiologist must not assume that a phone conversation between unfamiliar colleagues will break through an experienced surgeon's heuristics ("rules of thumb") that usually work well. Under the stress of a possibly evolving spinal cord injury, surgeon decision-making can be confounded by cognitive bias and error. The promotion of checklists in neurosurgery and orthopedic spine surgery has arisen to meet this problem. In one such checklist, there is a call to "summon" the "neurologist or neurophysiologist." The ability of a remotely sited neurophysiologist physician to enjoy the situational awareness and case vigilance to credibly answer this summons has been questioned. Possible solutions include optimized audiovisual connectivity of the off-site neurophysiologist, permitting the possibility of improved situational awareness, intercollegial familiarity/trust, and direct communication. Other options include 1) training and credentialing of the technologist already in the room to assume the interpretation and formal communication tasks, or 2) declare the surgeon as the in-room IONM supervisor. This latter approach suffers significant problems because surgeons seldom command the IONM body of knowledge. Also, there is likely an advantage in separation of the expert bodies of knowledge among the surgeon, anesthesiologist, and neurophysiologist. As a bottom line, surgeons should demand not only competently recorded IONM tests, but a trusted, situationally aware IONM interpreter/colleague who can meaningfully collaborate with other members of the intraoperative team.

Read Full Article Here

Communication Paradigms in IONM

Joshua Mergos, MS, CNIM
Intraoperative Neuromonitoring Program Director, Clinical Assistant Professor
University of Michigan – School of Kinesiology

It's always interesting when we find correlations between the natural and social sciences. Perhaps one of the most thorough yet broad examples of this is Edwin Friedman's study of leadership and the correlation between the health of organizations, both large and small, and that of individual organisms[1,2]. Time and time again we find striking similarities between these different sciences.

During my formal education in biomedical engineering, I took a keen interest in the way various nerve fibers can be electrically activated. I was also introduced to the field of IONM at this time and imagined that specific opportunities to apply this concept to intraoperative monitoring strategies must exist. Over time, this basic concept has recurred in my ongoing education and has carried into several research projects in which I'm currently involved. It has become quite fascinating to observe this, even as I've dipped my toe in non-traditional activities with colleagues across campus such as how individual personality roles and strategies impact team dynamics and decision making[3].

I'd like to discuss some similarities I've observed between team dynamics, specifically pertaining to communication, and how we activate and listen to the nervous system.

What are We Stimulating?

First, a quick review of the neurophysiology. There is a basic principle that governs the measure of electrical activity required to activate a cell membrane. Neurophysiologists take interest in this as we can quantify the amount of charge needed to depolarize an axon. Two basic parameters in this equation are current (measured in mA) and pulse duration (measured in microseconds or milliseconds). Rarely do we as neuromonitorists consider the fact that current is actually a rate of flow as opposed to a discrete quantity. Charge, a measureable quantity (in Coulombs), is calculated as the product of current and duration (i.e., the amount of charge permitted to cross through a specific area in a given amount of time). The amount of current, and thereby charge, required to depolarize a given axon changes based on the duration of stimulus. As pulse duration increases, the amount of current required to depolarize the axon exponentially decays, until it approaches a minimum asymptote, defined as rheobase[4].

Further to this, because all axon types have a specific membrane permeability and therefore a specific time constant, the current vs. duration curve will have a specific shape for each type of axon. There is a reason that we set our SSEP thresholds to a level slightly above where we observe a thumb twitch. At approximately 200-300usec duration, the threshold for both fast conducting motor fibers and the proprioceptive afferents responsible for producing the sub-cortical and cortical signals we observe is approximately equal[5]. This is due to the fact that both proprioceptive afferents and motor efferents have similar membrane permeability using this pulse duration. What's interesting is that at very low pulse durations (<0.1msec), motor fibers can be activated at lower current intensities than sensory fibers. For longer durations (>0.5msec), the relationship reverses, and sensory fibers have a lower current threshold than motor fibers (So yes, one solution for anesthesiologists constantly bothered by the effect of muscle twitching contaminating their O2 reading during SSEPs would be using very long duration pulses – but this could likely increase the energy used to a somewhat unsafe level). In summary, motor fibers can be independently activated with very short pulse durations (which lends strength to our confidence that the nerve action potentials we record during in situ peripheral nerve stimulation and mapping at ultra-low (30 – 50usec) pulse durations are indeed being generated by motor fibers) while sensory fibers can be independently activated at very long pulse durations. Much work has been put into understanding how to optimize stimulation of neural structures to ensure we are activating the proper pathway and conveying the proper signal orthodromically.

What are We Recording?

Which nerve fibers produce the Erb's point response? This is one of my students' favorite trick questions (sarcasm). The vague answer is "fibers that are activated at pulse durations of 300usec and around 15mA." We trick ourselves into thinking these are sensory fibers since they are part of the sensory pathway we are stimulating and recording, but again, since we are activating both sensory and motor fibers at the same threshold, and we know that these two types of fibers have similar nerve conduction velocities, what we record is a mixture of sensory and motor fiber action potentials. Many interesting techniques, including collision and latent addition[6] (a method designed to leverage the unique refractoriness of varying axon types) studies, have been developed over the past several decades to help further isolate the response recorded to specific fiber types. We are familiar with various methods of signal optimization from an acquisition standpoint – repetition rate, band pass, and sweep window size are all customizable parameters on modern-day IONM equipment that we use to optimize our recording. Some groups have even begun duplicating the same recording channel, but applying a different band pass filter to further discern and optimize the waveform of interest[7]. Perhaps it goes without saying, but the specific placement of electrodes is a strong contributor to what we record and how well we record it due to dipole orientation. When the signal sent contains multiple components, relaying various signals across different fibers, we optimize our recording or listening parameters to best visualize the component of interest.

Cultural Communication and Power Distance

While checklists have gained increasing popularity in the medical system's efforts to reduce medical errors, the root of most problems is communication. Oft cited are the significant efforts put forth by the aviation industry to close the gap in communication errors and how these should be implemented in the medical field[8, 9, 10]. Dr. Trey Coffey, Medical Officer for Patient Safety at the Hospital of Sick Children, spoke at this year's annual symposium on this very topic. She eloquently described the paradigm of chain of command and how this varies from culture to culture dependent on a factor described as power distance. This has been studied in an international context, observing how national cultural differences affect communication strategies[11]. Coffey has co-authored publications reporting data from the I-PASS study group, a multi-institutional effort studying the effects of implementing a standardized oral and written handoff program for medical residents[12].

The operating room has a culture of its own and perhaps even more interesting is the varying intraoperative cultures observed from one surgical specialty to the next. Additionally, academic vs. private practice institutions exude unique cultures of their own. To think this does not contribute to power distances and the perception of communicated neurophysiologic information is naïve. Dr. Polis from the University of Ottawa writes about the importance of a team-based approach in the operating room involving IONM as well[13]. Perhaps the greatest contributing factor to power distances in a hospital setting is level of education (followed by level of experience). This places neuromonitorists in a unique situation when attempting to convey crucial, imminent information to the surgeon. With no formalized, standardized didactic or clinical educational pathway, our credibility rests solely on the reputation we have established with each and every surgeon we work with. Additionally, we are communicating with an armamentarium of neurophysiological verbiage we've acquired during our training which may in some instances be a foreign language to the operating surgeon.

Communication Strategies and Signal Timing

We often describe the role of neuromonitorists as "an extra pair of eyes" or some other formulation of this. The main point is that our job is to observe and recognize potentially adverse events that the surgeon is literally blind to. Have we studied or fully understood the multitude of variables involved in a simple dialogue between two medical personnel separated by an oftentimes large power distance? With regards to a simple confrontational conversation, consider the following:

Tone, volume – Does our voice convey confidence and authority in what we're communicating, or are we simply relaying suggestions, waiting for the surgeon to validate an idea that we have? While we may not always have 100% confidence in an observed change or its etiology, we should be confident of any communicated change and our voice should reflect this.

Admission of multiple other causes – "Dr. Jones, I see some changes in my signal, but it might be a technical problem, or anesthetic in nature." Nobody likes to hear or believe bad news. If given the option, the surgeon can ignore this issue until they are told it absolutely needs to be addressed. When will it be?

Follow-up / call back - Do we have a system in place to be sure our surgeon has properly understood what we've communicated? One otolaryngologist our group works with prefers to hear "Nothing" when no response is elicited from nerve stimulation as "No Response" could easily be mistaken for "Response" if the "No" wasn't heard. May other departments, anesthesia to name one, have systems in place to call back an instruction that was given for the sake of eliminating misunderstanding.

Clarity / Specificity / Gravity – Have we explained the ramifications of the changes we've observed? "My left median nerve N20 response have dropped by 80% in amplitude" is quite different from "I'm concerned that I've lost isolated right lateral hemispheric signals consistent with right MCA distribution ischemia." We must remember that we are the experts with content-specific knowledge that can and should also provide context to each observed change.

Body language – Are we poised to covey this information and provide an audibly clear explanation? The surgeon steers the ship, and will rely on the information provided to him or her if it's believed to be credible. Poor body language is one way to quickly lose credibility.

As variable are our methods to activate neural structures, so too are the ways we communicate with our surgical colleagues. We may think we're maximizing our signal, but we could be neglecting an important variable, or communicating the wrong message altogether.

Furthermore, each surgeon has their own set of filters used to process what they're hearing. We've likely all worked with the surgeon who recently had a patient awaken with a postoperative brachial plexopathy. Every thirty minutes we're asked how the upper extremity SSEPs look. Or the surgeon who has experienced far too many IONM false positives due to subpar neuromonitoring. Our stance and response must be more resilient in these scenarios. These prior experiences influence how he or she will process the information provided and as such, we are wise to optimize our communication, most easily by providing clear and precise information.

References

1. Friedman E. Generation to Generation: Family Process in Church and Synagogue. New York: Guilford Press, 1985.
2. Friedman E. A Failure of Nerve: Leadership in the Age of the Quick Fix. New York: Church Publishing, Inc., 2007.
3. Lim BC, Ployhart RE. Transformational leadership: relations to the five-factor model and team performance in typical and maximum contexts. Journal of Applied Psychology 89(4), 610-21, 2004.
4. Burke D, Kiernan MC, Bostock H. Excitability of Human Axons. Clinical Neurophysiology 112(9): 1575-85, 2001.
5. Panizza, M; Nilsson, J; Roth, B J; Basser, P J; Hallett, M. Relevance of stimulus duration for activation of motor and sensory fibers: implications for the study of H-reflexes and magnetic stimulation. Electroencephalography & Clinical Neurophysiology. 85(1):22-9, 1992 Feb.
6. Bostock H, Rothwell JC. Latent addition in motor and sensory fibres of human peripheral nerve. Journal of Physiology 498(1): 277-94, 1997.
7. Balzer J. Equipment and Technology. Priniciples and Practice of Intraoperative Neuromonitoring. November 5, 2017. Pittsburgh, PA.
8. Gawande A. The Checklist Manifesto: How to Get Things Right. New York: Metropolitan Books, 2010.
9. Rampersad C, Low D, Rampersad S. The next frontier in patient safety: Improving outcomes through the effective use of checklists in the operating room environment. American Academy of Pediatrics (Winter 2012), 2012.
10. Ziewacz, et al. The design, development, and implementation of a checklist for intraoperative neuromonitoring changes. Neurosurgical Focus 33(5): E11, 2012.
11. Hofstede, G. Culture's consequences: International differences in work-related values. Beverly Hills, CA: Sage, 1980.
12. A.J. Starmer, et al. Changes in Medical Errors after Implementation of a Handoff Program. New England Journal of Medicine. 371(19): 1803-12, 2014.
13. Polis T. Intraoperative Neuromonitoring: Establishing a Positive Working Relationship in the Operating Room. Canadian IONM News. Vol. 5 (1), 2016.

Award of Excellence

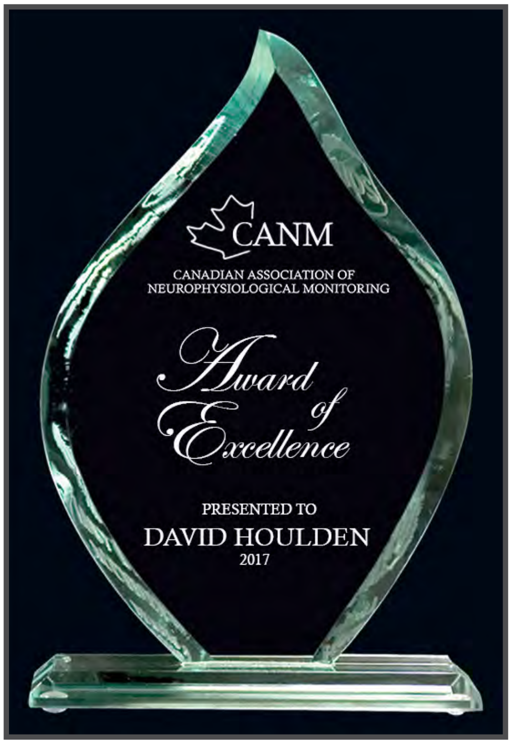
This award recognizes a healthcare professional who has made a significant impact on the field of intraoperative neurophysiology in Canada

The recipient has:

- Made significant, long-term contributions to intraoperative neurophysiology and demonstrated exceptional knowledge and expertise
- Outstanding achievements in intraoperative neurophysiology that have made a national impact in improving the quality of care, patient safety, education, training, and/or recognition of the field
- Commitment to CANM's mission and vision, and actively promoted and contributed to CANM's goals and objectives
- An exceptional track record of sharing their expertise with other health care professionals as documented by presentations and/or authorship of books, articles, and reference materials

Inaugural Recipient

David Houlden, PhD
Founding President of CANM

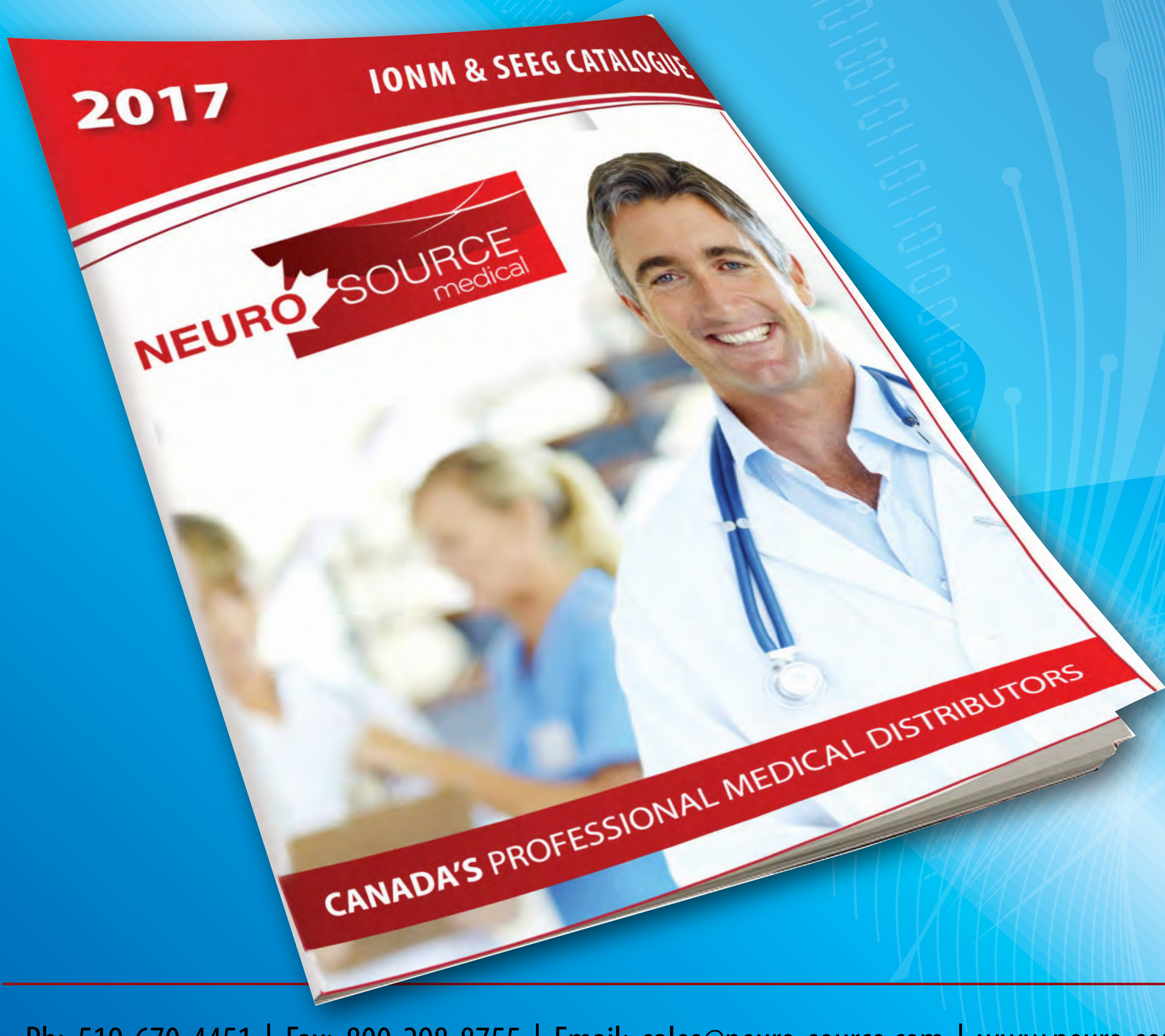


Presentation of Award of Excellence to David Houlden (left) by Laura Holmes (right) on Saturday September 16, 2017.

NEURO SOURCE medical

YOUR NUMBER ONE SOURCE FOR IONM SUPPLIES

“Exclusive Canadian Distributor for Dixi Medical”



Ph: 519-670-4451 | Fax: 800-298-8755 | Email: sales@neuro-source.com | www.neuro-source.com

IONM
Employment Opportunities

CLICK HERE
for more details
http://www.canm.ca/jobs/

To advertise a job opening contact info@canm.ca

Intraoperative Neurophysiological Monitoring Graduate Certificate Program

The Canadian Association of Neurophysiological Monitoring (CANM) and The Michener Institute of Education at UHN have partnered to introduce a one-of-a-kind Intraoperative Neurophysiological Monitoring (IONM) Graduate Certificate Program.

Full CANM members are permitted to take courses individually and non-sequentially without applying for the Graduate Certificate.

These courses are ideal for IONM practitioners looking for professional development or technologists interested in taking their career to the next level.

	Start date	Register by
IONM 120 Basic Principles of Intraoperative Neurophysiological Monitoring	Jan 8, 2018	Dec 15, 2017
IONM 150 Considerations for Intraoperative Neurophysiological Monitoring	Jan 8, 2018	Dec 15, 2017

Register today for **Winter 2018** courses!

For more information and to register visit **MICHENER.CA/CE/IONM**

CANM thanks Medtronic of Canada for their generous support of this education

THE Michener INSTITUTE of Education at UHN®

UHN

CANM CANADIAN ASSOCIATION OF NEUROPHYSIOLOGICAL MONITORING

222 St. Patrick Street | Toronto, Ontario | M5T 1V4 | **MICHENER.CA**