

# Program for Banff Motoneuron Meeting

June 12-16, 2022

**Main Sessions and Posters are in the Kinnear Centre Building**  
(rooms KC201/203/205)



Day 0: Sunday, June 12: arrival and informal hiking

<https://www.pc.gc.ca/en/pn-np/ab/banff/activ/randonee-hiking/banff>

Day 1: Monday, June 13

Remote presenters in green

## Introduction

8:35 Monica Gorassini (KC 203)

### Session #1 MNs AND ION CHANNELS – Chair: Claire Meehan: (Copenhagen)

8:45	Marc Binder (Seattle)	Cooperative gating of ion channels.
9:00	Frederic Brocard (Marseille)	Trmp5 channels encode bistability of spinal motoneurons and ensure motor control of hindlimbs in mice
9:15	Benoit Drouillas (Marseille)	Persistent NaV1.6 current promotes bistability in lumbar motoneurons to support hindlimb postural tone in mice
9:30	Remi Bos (Marseilles)	A size principle for bistability in mouse lumbar MNs
9:45	Calvin Smith (London)	Kv2.1 channels are not required for C-bouton Amplification of motor output
10:00	Chair	Discussion
10:15	<i>Morning break + Posters (KC 205)</i>	

### Session #2 DEVELOPMENT – Chair: Gareth Miles: (St. Andrews)

10:45	Simon Sharples (St. Andrews)	Postnatal integration of active properties shapes motoneuron recruitment
11:00	Joline Brandenburg (Rochester)	Mouse Models of Phrenic Motor Neuron Loss during Postnatal Development
11:15	Kimberly Dougherty (Philadelphia)	Developmental and injury-induced changes in cellular and synaptic properties of spinal premotor interneurons expressing Shox2
11:30	Sydney Dudley (Midwestern)	Muscarinic acetylcholine receptor subtype contribution to inspiratory bursting at hypoglossal motoneurons in neonatal mice in vitro.
11:45	Chair	Discussion
12:00	<i>Lunch (Vistas Dining Room in the Sally Borden Building) + Posters (KC 205)</i>	

### Session #3 Motoneuron and spinal circuit function in ALS – Chair: Kelvin Jones (Edmonton)

1:30	Zhenxiang Zhao (Copenhagen)	Cytoplasmic TDP-43 drives reversible hyperexcitability of spinal motoneurons.
1:45	Sherif Elbasiouny (Dayton)	Motoneuron excitability dysfunction in ALS
2:00	Kelvin Jones & Monica Gorassini (Edmonton)	Number and firing behaviour of human motor units in ALS
2:15	Daniel Zytnecki (Paris)	Early reversible structural and functional impairments of excitatory synapses on ALS motoneurons
2:30	Filipe Nascimento (London)	Spinal circuits early dysfunction in the SOD1G93A mouse model of Amyotrophic Lateral Sclerosis
2:45	Marcin Baczyk (Pozna)	Facilitation of proprioceptive Ia excitation and intrinsic excitability of spinal motoneurons by anodal trans-spinal direct current stimulation in SOD1 G93A mouse model of Amyotrophic Lateral Sclerosis
3:00	Chair	Discussion
3:15	<i>Afternoon break + Posters (KC 205)</i>	

### Session #4 TRIBUTE AND RAPID-FIRE TRAINEE TALKS – Chair: Hans Hultborn (Copenhagen)

3:45	Rob Brownstone (London)	Tribute and scientific accomplishments to the greats we have lost
4:15	Gregory Percy (Chicago)	Trainee Rapid Fire 3-minute Talks (in order of presentation):
	<ol style="list-style-type: none"><li>1. Gina Gnanasampanthan (St. Andrews)</li><li>2. Alex Yacyshyn (Edmonton)</li><li>3. Giulia Calabrese (St. Andrews)</li><li>4. Eli Hayes (Kelowna)</li><li>5. Hongkai Wang (Chicago)</li><li>6. Grace Niyo (Los Angeles)</li><li>7. Jacob Thorstensen (Gold Coast)</li><li>8. Marie Roussel (Quebec City)</li><li>9. Jess Leverett (Edmonton)</li><li>10. Ricardo Mesquita (Perth)</li><li>11. Sophie Jenz (Chicago)</li><li>12. Narges Karimi (Quebec City)</li><li>13. Trevor Barss (Edmonton)</li><li>14. Timothée Popescu (Lausanne)</li><li>15. Tyler Wells (Halifax)</li></ol>	
5:30	<i>Welcome reception (KC 103) and All posters (KC205)</i>	

## Day 2: Tuesday, June 14

### **Session # 5 RNAseq OF MOTONEURONS – Chair:** Keith Fenrich (Edmonton)

8:30	Mor Alkaslasi (Bethesda)	Demystifying transcriptomics
8:45	Ariel Levine (Bethesda)	What Human Motoneurons Are Made Of
9:00	Sam Pfaff (La Jolla)	MicroRNA regulation of motor neuron survival.
9:15	Claire LePichon (Bethesda)	Single nucleus RNA sequencing reveals unexpected diversity of spinal cholinergic neurons in the adult mouse
9:30	Jacob Blum (San Francisco)	Motor neuron heterogeneity and vulnerability in amyotrophic lateral sclerosis
9:45	Chair	Discussion
10:00	<i>Morning break + Posters (KC 205)</i>	

### **Session #6 Molecular changes in ALS and SMA - Chair:** Vic Rafuse (Halifax)

10:30	Hemali Phatnani (New York)	Spatiotemporal dynamics of molecular pathology in ALS.
10:45	Calum Bonthron (St. Andrews)	Selective Vulnerability of Tripartite Synapses in Amyotrophic Lateral Sclerosis
11:00	Vivian Ko (San Diego)	CK1 $\mu$ -dependent TDP-43 phosphorylation in ALS
11:15	Kelly A Marshall (Chicago)	Nuclear loss of TDP-43 causes a determinantal exon-skipping event in the RNA of the ion-channel KCNQ2 in ALS-patient neurons.
11:30	Francesco Roselli (Ulm)	The motoneuronal receptorome in ALS reveals adrenergic entry points to modulate MN excitability and firing
11:45	Yongchao Ma (Chicago)	Regulation of mitochondria-induced neuroinflammation and motor neuron degeneration in Spinal Muscular Atrophy (SMA) by RNA methylation
12:00	Chair	Discussion

*Lunch + Posters*

### **Session #7 FREE TIME AND POSTERS**

1:30	Poster session and free time
3:30	Afternoon break

### **Session #8 NEUROTRAUMA AND MOTONEURONS 1 – Chair:** Marie-Pascale Cote (Philadelphia)

4:00	Collin Franz (Chicago)	A human stem cell based-assay to define how a highly
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		prevalent genetic variation increases motor neuron vulnerability to mechanical injury
4:15	Alex M Laliberte (Ottawa)	Pre-motor dl3 interneurons regulate hindlimb motor tone in spinalized mice.
4:30	Frederic Bretzner (Quebec City)	Plasticity and contribution of mesencephalic locomotor region nuclei to functional motor recovery after chronic spinal cord injury in the mouse.
4:45	Gregory Pearcey (Chicago)	Acute intermittent hypoxia effects on strength and motor unit discharge rates in SCI.
5:00	Han Zhang (Edmonton)	Spinal lumbar V3 INs are crucial in the recovery of locomotion after SCI
5:30	Chair	Discussion

7:00 – 9:00PM **ALS RECEPTION (KC 103) SPONSORED BY PROJECT ALS (see PAGE 7 for details)**

### Day 3: Wednesday, June 15

#### **Session #9 INPUTS TO MOTONEURONS 1 – Chair:** Patrick Whelan (Calgary)

8:45	Maria Piotrkiewicz (Worsaw)	Evaluation of new methods for estimating the characteristics of IPSPs in human motoneurons
9:00	Kemal Turker (Istanbul)	Discharge rate method to study human Renshaw inhibition.
9:15	Gorkem Ozyurt (London)	The connectivity pattern of recurrent excitatory connections between motoneurons.
9:30	Amr Mahrous (Chicago)	Rebound extensor response following electrical stimulation of the lumbar spinal cord
9:45	Chair	Discussion
10:00	<i>Morning break + Posters</i>	

#### **Session #10 SYMPATHETIC NEURONS & SEROTONIN Chair:** Dave Bennett (Edmonton)

10:30	Yaqing Li (Atlanta)	Plasticity of vasomotor sympathetic paravertebral postganglionic neurons after spinal cord injury
10:45	Nicholas Au Yong (Atlanta)	The Influence of Phrenic Sympathetic Activity on Diaphragm Contractile Properties
11:00	Jeremy Chopek (Winnipeg)	Locomotor related spinal V3 interneurons innervate sympathetic preganglionic neurons in the mouse.

11:15	Benjamin Goodlich (Australia)	5-HT <sub>2</sub> receptors play a critical role in motor unit discharge rate in humans
11:30	Nicolas Delestree (New York)	Dysfunction in serotonergic neuromodulation impairs locomotor coordination in spinal muscular atrophy
11:45	Chair	Discussion

12:00 *Lunch + Posters*

### Session #11 AXONS AND INJURY

**Chair:** Shawn Hochman (Atlanta)

1:30	Travis Rotterman (Atlanta)	Ia afferent synapses are temporarily restored but not retained on motoneurons by minocycline treatment following peripheral nerve injury
1:45	Nick Housley (Atlanta)	Sensorimotor Circuit Collapse After Cancer Treatment
2:00	Krishnapriya (Veni) Hari (Edmonton)	Constitutive GABA <sub>A</sub> receptor activity contributes to exaggerated sensory transmission to motoneurons and muscle spasms after spinal cord injury
2:15	Shawn Hochman (Atlanta)	Spike conduction in preganglionic axons is modifiable and has the capacity to shape sympathetic output divergence across paravertebral ganglia.
2:30	Lucy Liang (Pittsburgh)	Corticospinal Tract Modulation of Sensory Information Through GABAergic Interneurons
2:45	Chair	Discussion

3:00 *Afternoon break + Posters*

### Session #12 HUMAN MOTONEURONS – **Chair:** Maria Knikou (New York)

3:30	Gabriel Siqueira Trajano (Brisbane)	Intrinsic motor neurone excitability is increased after resistance training in older adults
3:45	Justine Magnuson (Kelowna)	Corticomuscular coherence and neuromuscular function with force and EMG matching submaximal fatigue tasks
4:00	James Beauchamp (Chicago)	Potential deficits in isometric ankle torque control introduced by persistent inward currents in humans
4:15	Yasin Dhaher (Dallas)	Dissecting the separate effects of descending tracts on spinal motor circuits
4:30	Matthieu Chardon (Chicago)	Supercomputer, Neural Network Simulations and Reverse Engineering of Motoneuron Firing Patterns
4:45	Chair	Discussion

7:00

*Gala Dinner and Binderfest (KC101/103)*

## Day 4: Thursday, June 16

### **Session #13 NEUROTRAUMA AND MOTONEURONS 2 – Chair:** Dave Collins (Edmonton)

9:00	Jeremy Weinberger (Philadelphia)	Multisite Electrode Array to Optimize Epidural Stimulation for Spasticity Following Spinal Cord Injury
9:15	Amanda Pocratsky (London)	Pathophysiology of Dyt1 dystonia is mediated by spinal cord dysfunction
9:30	Alexandra Lackmy-Vallee (Paris)	Undamaged hemisphere activation enhances control on spinal networks of the affected arm post-stroke.
9:45	David Leo Garcia Ramirez (Philadelphia)	SCI-induced plasticity of sensory afferent input pathways and 5-HT modulation of Shox2 interneurons following epidural stimulation in mouse
10:00	Chair	Discussion
10:15	<i>Morning break</i>	

### **Session #14 INPUTS TO MOTONEURONS 2 – Chair:** Rob Brownstone (London)

10:45	Martin Zaback (Philly)	Assessing the functional connectivity of spinal neurons.
11:00	David McClean (Chicago)	Mixed synapses entangle excitability and connectivity in the zebrafish spinal cord.
11:15	Robyn L. Mildren (Baltimore)	Vestibular contributions to neck postural muscle activity during natural motion experienced in everyday life
11:30	Olivier D. Laflamme (Halifax)	The involvement of V0 and V3 Commissural Interneurons in Crossed Reflexes
11:45	Chair	Discussion
12:00	<b>General Discussion and Business meeting</b>	
12:45	<i>Lunch</i>	

## ALS Reception (Room KC 103)

Tuesday June 19:00-22:00

### **Purpose:**

The International Motor Neuron Society was “founded” with a primary purpose being bringing together investigators of human motor units and those of animal motor neurons such that together our progress would be more than the sum of our parts.

Throughout the years that we have been meeting, there has been increasing interest in ALS in our Society. Collectively, we have expertise in motoneuron, interneuron, and circuit physiology and pathophysiology in animal models and in people with ALS.

This evening, we ask the question of whether together we can chart a course for faster progress in understanding ALS and other motor neuron diseases. We will hear about some recent initiatives from Project ALS to understand these diseases and to discover novel treatments for people with ALS. We will then have an open moderated discussion with the aim of coming up with concrete steps to improving progress.

Here are some general discussion questions that you may want to consider prior to the evening:

- Why do animal research / physiology in ALS?
- How do we align animal and human physiological research? What can each group learn from the other? (Really the *raison d'être* of the Society.)
- What do we need to know about the pathophysiology of ALS? (i.e. how do we avoid non-meaningful directions)
- Consider the variables (familial vs sporadic ALS, sexual dimorphism, different animal models, different muscles, different motoneurons, different time points, and what about brains?)
- Can we contribute useful biomarkers (e.g. human motor unit counts/firing behaviour) to the field?

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