Motor Control: Spinal Circuits and Beyond
University of St Andrews, June 17-20, 2025

https://motor-circuits.wp.st-andrews.ac.uk/

Day 1: Tuesday, June 17

11:30	**Arrival & Check-in**	**Medical Sciences Building**
16:30	Dave McLean (University of Edinburgh)	**Introduction**
16:45	Keith Sillar (University of St Andrews)	**Opening Lecture**
17:30	**Reception (Drinks & Canapés)**	**Medical Sciences Building Café**

Day 2: Wednesday, June 18

Session # 1: Rhythm & Pattern Generation

9:00	**Chairs** Jessica Ausborn & Muriel Thoby-Brisson	**Introduction**
9:15	Simon Gosgnach (University of Alberta)	**Molecular characterization of neurons involved in locomotor rhythmogenesis**
9:30	Urs Böhm (Institute for Psychiatry and Neurosciences of Paris)	**Optical recording of spinal cord dynamics with voltage imaging**
9:45	Charlotte Le Mouel (Sorbonne Université)	**Decreased spinal inhibition leads to un-diversified locomotor patterns**
10:00	Sufyan Ashhad (National Centre for Biological Sciences)	**PreBötzinger Complex subcritical oscillations underlie instantaneous switches in breathing dynamics**
10:15	Evgeny Bondarenko (University of California, Los Angeles)	**Subthreshold oscillations of preBötzinger Complex VGluT2$^+$ neurons enable instantaneous modulation of inspiratory rhythm generation *in vivo***

10:30	William Smith (University of St Andrews)	**Neuromodulation of motor competition in the *Drosophila* larval locomotor system**
10:45	**Coffee & Tea**	**Medical Sciences Building Café**

Session # 2: Motoneuron Diseases

11:15	**Chairs** Claire Meehan & Santiago Mora Parada	**Introduction**
11:30	Christian Simon (Leipzig University)	**Motor neuron pathology drives spinal circuit defects and motor phenotype of a mouse model for spinal muscular atrophy with respiratory distress type 1**
11:45	Matthew Broadhead (University of St Andrews)	**The Honeycomb synapse: A story of synaptic diversity and vulnerability**
12:00	Florian Gerstner (Leipzig University)	**Cerebellar pathology contributes to motor deficits in spinal muscular atrophy**
12:15	Alyssa Corbett (University of St Andrews)	**Gliotransmission is dysfunctional in spinal motor networks of presymptomatic SOD1 mice**
12:30	**Lunch**	**Medical Sciences Building Café**

Session # 3: Spinal Cord Injury

14:00	**Chairs** Carmelo Bellardita & Tuan Bui	**Introduction**
14:15	Dimitri Ryczko (Université de Sherbrooke)	**Restoring neural control: regeneration of descending pathways following complete spinal cord injury in salamanders**
14:30	Carina Seidl (Institute of Molecular Biotechnology)	**Patterning and functionality of the regenerated nervous system**
14:45	Amanda Bernstein (Burke Neurological Institute)	**Enhancing nerve transfer surgery to restore hand and arm movement in chronic tetraplegia**
15:00	Nejada Dingu (Aix-Marseille University)	**Na^+/K^+-ATPase dysfunction via calpain-1 fuels motoneuron hyperexcitability and spasticity after spinal cord injury**

15:15	D. Leonardo Garcia-Ramirez (Drexel University)	**Effects of spinal activation strategies after spinal cord injury on lumbar locomotor circuit plasticity**
15:30	**Coffee & Tea**	**Medical Sciences Building Café**

Session # 4: Descending Control

16:00	**Chairs** Eiman Azim & Martha Bagnall	**Introduction**
16:15	Bella Xu Ying (University of St Andrews)	**Context-dependent coordination of movement in *Tribolium castaneum* larvae**
16:30	Nathalie Krauth (University of Copenhagen)	**A hypothalamus-brainstem circuit governs the prioritization of safety over essential needs**
16:45	Timothy Machado (University of Pennsylvania)	**From cortex to the premotor network: Descending circuits for orofacial control**
17:00	Andrew Miri (Northwestern University)	**Neural activity dynamics of descending control across diverse ethological behaviors**
17:15	Vibhu Sahni (Burke Neurological Institute)	**Development organization and function of cortico-brainstem connectivity**
17:30	Mahalakshmi Dhanasekar (Paris Brain Institute)	**Sustained noradrenergic neuron activation and the subsequent triggering of a glial calcium wave disrupt motor commands from brain to spinal cord**
17:45	**Reception (Drinks & Canapés)**	**Medical Sciences Building Café**
19:00	**Bonfire (+ Pizza)**	**West Sands**

Day 3: Thursday, June 19

Session # 5: Sensorimotor Integration

9:00	**Chairs** Ian Duguid & Claire Wyart	**Introduction**
9:15	Alessandro Santuz (Max Delbrück Center for Molecular Medicine)	**The cost of sensory loss: irreversible motor deficits scale with the degree of proprioceptor ablation**
9:30	Dominic Falardeau (Université de Montréal)	**Exploring the role of brainstem trigeminal premotor areas in masticatory function**

9:45	Anders Nelson (New York University)	**Challenging textbook depictions of an ascending spinal circuit**
10:00	Elias Lunsford (Paris Brain Institute)	**Directional cues relative to center-of-mass shapes somatotopy of lateral line inputs in the brainstem**
10:15	Emily Reader-Harris (University of Leeds)	**The role of the lateral vestibular nucleus in neural control of walking and balance**
10:30	**Coffee & Tea**	**Medical Sciences Building Café**
11:00	Sahar Zadka (Weizmann Institute of Science)	**Voltage imaging reveals ultrafast plasticity for the error computations in the cerebellum**
11:15	Nicolas Wanaverbecq (Aix-Marseille University)	**In mice, Lumbar CSF-contacting neurons are sensory neurons modulating cardinal motor interneurons**
11:30	Jitka Veldema (Bielefeld University)	**Non-invasive spinal cord stimulation in supporting balance control**
11:45	Antoine Valera (University of Strasbourg)	**Decoding activity patterns across pyramidal cell dendritic trees during spontaneous behaviours using 3D imaging**
12:00-14:45	**Posters (1-35)**	**Medical Sciences Building**
12:30	**Lunch**	**Medical Sciences Building Café**
14:30	**Coffee & Tea**	**Medical Sciences Building Café**
15:00	**Free/Active Time – Hiking/Golf/Driving Range/Whisky Tasting**	**Fife Coastal Path/Crail Golfing Society/St Andrews Links Golf Academy/Kingsbarns Distillery**

Day 4: Friday, June 20

Session # 6: Premotor & Propriospinal

9:00	**Chairs** Graziana Gatto & Laskaro Zagoraiou	**Introduction**
9:15	James Jepson (University College London)	**Coupled *Drosophila* and mouse studies reveal a pharmacological suppressor of**

		intrinsic spinal circuit dysfunction in genetic models of dystonia
9:30	Léandre Lavenu (Université de Bordeaux)	**Vestibular inhibitory networks orchestrate the vestibulospinal control of posture in *Xenopus laevis* tadpoles**
9:45	Timothy Cope (Georgia Institute of Technology)	**A species-specific spinal circuit for coordinating antagonist motor pools**
10:00	Wen-Chang Li (University of St Andrews)	**Neuromechanics of a vertebrate escape behaviour mediated by axial muscles after capture**
10:15	**Coffee & Tea**	**Medical Sciences Building Café**
11:00	Jay Bikoff (St. Jude Children's Research Hospital)	**A brain-wide map of descending inputs onto spinal V1 interneurons**
11:15	Alex Adams (New York University)	**Establishing flexible spinal circuits for locomotor and postural control**
11:30	Lora Sweeney (Institute of Science and Technology Austria)	**Innovations in spinal cord cell type heterogeneity during vertebrate evolution**
11:45-14:45	**Posters (36-75)**	**Medical Sciences Building**
12:30	**Lunch**	**Medical Sciences Building Café**
14:30	**Coffee & Tea**	**Medical Sciences Building Café**

Session # 7: Motoneurons

15:00	**Chairs** Marco Beato & Jasper Phelps	**Introduction**
15:15	Ivica Matak (University of Zagreb)	**Effects of botulinum toxin type A on the spinal motor control: not just a peripheral player?**
15:30	Celine Bellegarda (New York University)	**Birth timing predicts tuning and response strength across extraocular motor neuron pools**
15:45	Stephanie Gaudreau (University of Ottawa)	**Developmental changes in the control of primary motoneuron firing properties by multiple ion currents in larval zebrafish**
16:00	Filipe Nascimento (University College London)	**Personalized mapping of inhibitory spinal circuits via neural decoding of high-density electromyography and in silico modelling**

16:15	Merkourios Simos (École Polytechnique Fédérale de Lausanne)	**Reinforcement learning-based motion imitation for physiologically plausible musculoskeletal motor control**
16:30	Samuel Sober (Emory University)	**Motor unit mechanisms of speed control in mouse locomotion**
16:45	Conference Organizers	**Concluding Remarks**
18:00	**Dinner & Ceilidh (Full registration only)**	**Upper/Lower College Hall, St Salvator's Quadrangle**