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ResearcherID: http://www.researcherid.com/rid/E-1064-2019

Education and Research Experience

CIHR Postdoctoral Fellow	**Cincinnati Children's Hospital Medical Center** Department of Neurosurgery, Advisor: Steven Crone	**2024-Present**
CIHR Postdoctoral Fellow **Newton International Fellow**	**University of St Andrews** School of Psychology and Neuroscience, Advisor: Gareth Miles	**2022-2023** **2019-2022**
PhD	**University of Calgary** Department of Neuroscience, Advisor: Patrick Whelan	**2012-2018**
MSc	**Wilfrid Laurier University** Department of Kinesiology, Advisor: Jayne Kalmar	**2010-2012**
BSc	**Wilfrid Laurier University** Department of Kinesiology and Physical Education	**2006-2010**

Scientific Mission

I am a Canadian postdoctoral fellow working in the Lab of Dr. Steven Crone at the Cincinnati Children's Hospital Medical Center and am currently supported by a Fellowship from the Canadian Institute for Health Research. I have a passion for teaching and research, and it is my goal to pursue a career in academia. To date, I have procured over $1 million (CAD) in competitive funding to support my research, which aims to understand fundamental mechanisms that underlie the nervous system's ability to produce flexible and adaptable movements. To address this aim, I deploy a cutting-edge tool kit in rodent models to study circuits in the spinal cord that control locomotion and breathing. By generating a fundamental mechanistic understanding of how these circuits function, it is my goal to reveal novel therapeutic strategies or targets to attenuate breathing and locomotor dysfunction following neural injury and disease. In addition to research, I also have a passion for teaching and mentorship. It is my goal to develop a research program of my own that will be enriched by teaching systems physiology at undergraduate and graduate levels.

Publications (20)

Google Scholar: https://scholar.google.ca/citations?user=FT0qh8UAAAAJ&hl=en

	Prior to	2018	2019	2020	2021	2022	*2023*	***2024***	***Total***
Publications	9	2	1	4	1	1	2	***0***	***20***
Lead & co-lead authored	6	2	0	4	1	1	1	0	**16**
Senior & corresponding authored	1	0	0	0	0	0	0	0	**1**
Active Preprints								1	**1**
Manuscripts In Preparation								11	
Abstracts	28	1	5	0	6	11	12	**9**	**68**

For all published work, my name is **bold**, trainees that I directly mentored are *italicized* and underlined, and * denotes equal contribution. Key external collaborators are highlighted in Red font.

Peer-Reviewed Research Articles (12)

Sharples, S.A., Broadhead, M.J., Gray, J.A., and Miles, G.B. (2023). M-type potassium currents differentially affect activation of motoneuron subtypes and tune recruitment gain. ***Journal of Physiology***. 601 (24): 5751-5775. DOI: 10.1113/JP285348. (IF: 6.2; Citations: 2).

Eleftheriadis, P.E.*, Pothakos, K.*, **Sharples., S.A.,** Apostolou, P., Mina, M., Tetringa, E., Miles, G.B., and Zagoraiou, L. (2023). Peptidergic modulation of motor neuron output via CART signalling at C bouton synapses. ***Proc. Natl. Acad. Sci.*** 120 (39). e2300348120. DOI: 10.1073/pnas.2300348120.(IF: 12.8,citations: 2).

Sharples, S.A., Parker, J., Vargas, A., Milla-Cruz, J.J., *Lognon, A.P.*, Cheng, N., Young, L., Shonak, A., Cymbalyuk, G., and Whelan, P.J. (2022). Contributions of h- and Na^+/K^+ pump currents to the generation of episodic and continuous rhythmic activities. ***Frontiers in Cellular Neuroscience.*** 15: 715427. DOI:10.3389/fncel.2021.715427. (IF: 4.9, citations: 8).

Sharples, S.A. and Miles, G.B. (2021). Maturation of persistent and hyperpolarization-activated inward currents shapes the differential activation of motoneuron subtypes during postnatal development. ***eLife.*** 10: e71385. DOI: 10.7554/eLife.71385. (IF: 8.7, citations: 28).

Sharples, S.A., Burma, N.E., Borowska-Fielding, J., Kwok, C.H.T., Eaton, S.E.A, Baker, G., Jean-Xavier, C., Zhang, Y.C., Trang, T., and Whelan, P.J. (2020). A dynamic role for dopamine receptors in the regulation of mammalian spinal motor networks. ***Scientific Reports.*** 10: 16429. DOI: 10.1038/s41598-020-73230-w. (IF: 5.0, citations: 14).

Dalrymple, A.N., **Sharples, S.A.,** *Osachoff, N.*, *Lognon, A.P.*, and Whelan, P.J. (2019). A supervised machine learning approach to characterize spinal network function. ***Journal of Neurophysiology***. 121 (6): 2001-2012. DOI: 10.1152/jn.00763.2018. (IF: 2.7; citations: 9).

Sharples, S.A. and Whelan, P.J. (2017). Modulation of rhythmic activity in mammalian spinal networks is dependent on excitability state. ***eNeuro***. 4 (1): ENEURO 0368-16.2017. DOI:10.1523/ENEURO.0368-16.2017. (IF: 4.4, citations: 33).

Mandadi, S., Leduc-Pessah, H., Hong, P., Ejdrygiewicz, J., **Sharples, S.A.,** Trang, T., and Whelan, P.J. (2016). Modulatory and proliferative effects of kinins on the developing spinal cord. ***Journal of Physiology***. 594 (4): 1017-1036. DOI: 10.1113/JP271152. (IF: 6.2, citations: 10).

Sharples, S.A., Gould, J.A., Vandenberk, M.S., and Kalmar, J.M. (2016). Cortical mechanisms of neuromuscular fatigue and sense of effort. ***Plos ONE***. 11 (2): e0149026. DOI: 10.1371/journal.pone.0149026. (IF: 3.6, citations: 36).

Sharples, S.A., Humphreys, J.M., Jensen, A.M., Dhoopar, S., Delaloye, N., Clemens, S., and Whelan, P.J. (2015). Dopaminergic modulation of locomotor network activity in the neonatal mouse spinal cord. ***Journal of Neurophysiology***. 113 (7): 2500-2510. DOI: 10.1152/jn.00849.2014. (IF: 2.7, citations: 56).

Sharples, S.A., Almeida, Q.J., and Kalmar, J.M. (2014). Cortical mechanisms of mirror activation during maximal and submaximal finger contractions in Parkinson's disease. ***Journal of Parkinson's Disease***.4, 437-452. DOI: 10.3233/JPD-130316. (IF: 5.5, citations: 9).

Sharples, S.A. and Kalmar, J.M. (2012). Modulation of cortical excitability and interhemispheric inhibition prior to rhythmic unimanual contractions. ***Journal of Neuroscience Methods.*** 210 (2): 178-186. DOI: 10.1016/j.neumeth.2012.07.018. (IF: 2.8, citations: 20).

Peer-Reviewed Commentaries and Review Articles (5)

Sharples, S.A. and Whelan, P.J. (2018). Amyotrophic lateral sclerosis: Marking the differences in motoneurons. ***eLife***. 2018; 7: e36832. DOI: 10.7554/eLife.36832. (IF: 8.7. citations: 1).

Jean-Xavier, C. *****, **Sharples, S.A.***, Mayr, K.A., *Lognon, A.P.*, and Whelan, P.J. (2018). Retracing your footsteps: developmental insights into spinal network plasticity following injury. ***Journal of Neurophysiology***. 119 (2): 521-536. DOI: 10.1152/jn.00575.2017. (IF: 2.7; citations: 19).

Kim, L. *****, Sharma, S. *****, **Sharples, S.A.**, Mayr, K.A., Kwok, C., and Whelan, P.J. (2017). Integration of descending command systems for the generation of context-specific locomotor behaviour. ***Frontiers in Neuroscience***. 11: 581. DOI: 10.3389/fnins.2017.00581. (IF: 5.2, citations: 66).

Sharples, S.A. (2017). Dopamine pumping up spinal locomotor network function. ***Journal of Neuroscience***. 37 (12): 3103-3105. DOI: 10.1523/JNEUROSCI.0019-17.2017. (IF: 6.7, citations: 7).

Sharples, S.A., Koblinger, K, Humphreys, J.M., and Whelan P.J. (2014). Dopamine: a parallel pathway for the modulation of spinal locomotor networks. ***Frontiers in Neural Circuits.*** 8: 55. DOI: 10.3389/fncir.2014.00055. (IF: 3.3, citations: 162).

Textbooks and Chapters (3)

Whelan, P.J. and **Sharples, S.A.** (2020). Neural control of movement: Model systems and tools to study locomotor function. ***Editor.*** *Elsevier Academic Press.* ISBN: 9780128164778. DOI: 10.1016/C2018-0-00499-5.

Sharples, S.A. and Whelan, P.J. (2020). A tale of many models. Which one creates the best of times? ***Invited book chapter*** in Neural control of movement: Model systems and tools to study locomotor function. *Elsevier Academic Press.* P419 – 426. DOI: 10.1016/B978-0-12-816477-8.00016-8.

Sharples, S.A. and Whelan, P.J. (2020). An interphyletic tool kit to study locomotor function: past, present, and future directions. ***Invited book chapter*** in Neural control of movement: Model systems and tools to study locomotor function. *Elsevier Academic Press.* DOI: 10.1016/B978-0-12-816477-8.09997-X. (Citations: 3).

Open-Source Data (4)

Milla-Cruz, J.J., *Lognon, A.P.*, Tran, M., Di Vito, S., *Löer, C.*, Shonak, A., Broadhead, M.J., Miles, G.B., **Sharples, S.A.** [+]**,** and Whelan, P.J. [+]. Episodic rhythmicity is generated by a distributed neural network in the developing mammalian spinal cord. DOI: 10.17605/OSF.IO/K56G4

Sharples, S.A., Broadhead, M.J., Gray, J.A., and Miles, G.B. M-type potassium currents differentially affect activation of motoneuron subtypes and tune recruitment gain DOI: 10.1706/OSF/IO/26JYN.

Sharples, S.A., Parker, J., Vargas, A., Milla-Cruz, J.J., *Lognon, A.P.*, Cheng, N., Young, L., Shonak, A., Cymbalyuk, G., and Whelan, P.J. (2022). Contributions of h- and Na^+/K^+ pump currents to the generation of episodic and continuous rhythmic activities. ***ModelDB***: 267253.

Dalrymple, A. N., **Sharples, S. A**., *Osachoff, N.*, *Lognon, A.*, & Whelan, P. J. (2019). A Supervised Machine Learning Approach to Characterize Spinal Network Function. DOI: 10.17605/OSF.IO/R7SG6.

Theses (3)

State-dependent neuromodulation of mammalian spinal networks. (2018). University of Calgary. Department of Neuroscience. Supervisor: Dr. Patrick Whelan.

Cortical mechanisms of unimanual control. (2012). Wilfrid Laurier University. Department of Kinesiology. Supervisor: Dr. Jayne Kalmar

Modulation of cortical excitability and interhemispheric inhibition prior to rhythmic unimanual contractions. (2010). Wilfrid Laurier University. Department of Kinesiology. Supervisor: Dr. Jayne Kalmar

Preprints (1)

Milla-Cruz, J.J., *Lognon, A.P.*, Tran, M., Di Vito, S., *Löer, C.*, Shonak, A., Broadhead, M.J., Miles, G.B., **Sharples, S.A.** [+]**,** and Whelan, P.J. [+]. Episodic rhythmicity is generated by a distributed neural network in the developing mammalian spinal cord. ***BioRxiv.*** DOI: 2024.07.26.605187. [+]*Co-corresponding Authors. Status: In Revision at iScience.*

Manuscripts in Preparation (11)

Lin, M.*, *Calabrese, G.B.**, Incogneto, A.V., Wilson, R.J., Zagoraiou, L., **Sharples, S.A.**[+], Miles, G.B.[+], Philippidou, P. [+]**.** A cholinergic spinal pathway for the amplification of breathing. *(Fall 2024).* [+] *Co-corresponding Authors.*

Sharples, S.A., Sorrell, F.L., and Miles, G.B. Spinal neurons with a biophysical signature consistent with a gamma motoneuron identity emerge during the third week of postnatal development in mice. *(Fall 2024).*

Broadhead, M.J., Butler, E., Avayzian-Hancock, A., **Sharples, S.A.,** and Miles, G.B. Postsynaptic honeycomb structure of 1a afferents to spinal cord motor neurons. *(Fall 2024).*

Sharples, S.A. and Miles, G.B. Developmental mechanisms of firing hysteresis in spinal motoneurons of the postnatal mouse. *(Fall 2025).*

Sorrell, F.L., **Sharples, S.A.**, Broadhead, M.J., and Miles, G.B. Diversity, and flexibility of post discharge activities in mammalian spinal motoneurons. *(Winter 2025)*.

Milla-Cruz, J.J., **Sharples, S.A.**, *Lognon, A.P.*, Shonak, A., Cheng, N., and Whelan, P.J. Glutamatergic and calcium activated potassium channel contributions to the generation of episodic rhythmicity. *(Winter 2025)*.

Lognon, A.P., **Sharples, S.A.,** Humphreys, J.M., and Whelan, P.J. State-dependent roles for T-type calcium channels in the control of mammalian spinal motor networks. *(Spring 2025).*

Nisbet, S., Miles, G.B., and **Sharples, S.A.** Neuromodulation of rhythmic activity in the mammalian spinal cord via control of Na+/K+ ATPase pumps. *(Spring 2025).*

Kalmar, J.M., **Sharples, S.A.** and Pearcey, G.E.P. The neural control of movement in exercise. ***Invited book chapter*** in "Online textbook of exercise physiology". Editor: Brian R. MacIntosh. *(Spring 2025).*

Löer, C., **Sharples, S.A.**, McCafferey, P., and Miles, G.B. Non-genomic modulation of spinal circuits and motoneuron intrinsic properties by retinoic acid receptors in postnatal mice. *(Spring 2025).*

Burley, S, **Sharples, S.A.**, Bonthron, C., Broadhead, M.J., Morrison, K., Miles, G.B., and Sleeman, J. Protein methylation as a mechanism for cellular damage in motor neuron disease. *(Spring 2025).*

Research Communications

Oral Presentations (24)

Invited Research Lectures (7)

'Diversification of motoneuron subtypes and their neuromodulatory control during postnatal development in mice'. Canadian Neuroscience Seminar – Postdoctoral Series. September 2023.

'Diversification of motoneuron subtypes and their neuromodulatory control during postnatal development in mice'. University of Calgary. Neural Circuits for Movement Lab (PI: Patrick Whelan). March 2023.

'A cholinergic modulatory pathway for the amplification of breathing'. University of Calgary. Neural Circuits for Breathing Lab (PI: Richard Wilson). March 2023.

'Moving beyond the size principle: How the integration of active properties shapes motoneuron recruitment during postnatal development'. The Online Motor Unit Seminar Series. February 2022.

'Activity-dependent regulation of motoneuron excitability'. University College London, Neural Circuits for Movement Lab (PI: Rob Brownstone). August 2019.

'Dopaminergic control of spinal networks: 'A balancing act between excitability state and receptor actions' Spinal Cord and Movement Group, University of St Andrews, St. Andrews, Scotland, August 2017.

'Dopaminergic regulation of spinal networks for locomotion'. Department of Kinesiology, Wilfrid Laurier University, Waterloo, ON, September 2016.

International (5)

Calabrese, G.B., **Sharples, S.A.**, Lin, M., Ingognito, A., Wilson, R., Zagoraiou, L., Philippidou, P., and Miles, G.B. Modulation of respiratory-related motoneuron output by spinal cholinergic interneurons. *International Motoneuron Society Meeting.* Bordeaux, France, June 2024

Eleftheriadis, P.E., Pothakos, K., **Sharples., S.A.,** Apostolou, P., Mina, M., Tetrigga, E., Miles, G.B., and Zagoraiou, L. CART modulation of motor neuron output at C bouton synapses. *Motor Control: Spinal Circuits and Beyond*, St Andrews, United Kingdom, June 2023.

Calabrese, G.B., Broadhead, M.J., Incognito, A.V., Motherwell, L., Wilson, R.J., **Sharples, S.A.**, and Miles, G.B. Spinal cholinergic modulation of spinal circuits for breathing. *Motor Control: Spinal Circuits & Beyond.* St Andrews, UK. June 2023.

Sharples, S.A. and Miles, G.B. Fast motoneurons are not just 'big' slow motoneurons: roles for active properties in maintaining the orderly recruitment of motoneuron subtypes. *Motor Systems Symposium.* Salk Institute, La Jolla, CA, United States, November 2022.

Sharples, S.A. and Miles, G.B. Postnatal integration of active properties shapes motoneuron recruitment. *International Motoneuron Society Meeting.* Banff, AB, Canada, June 2022.

National (3)

Nisbet, S., **Sharples, S.A.,** and Miles, G.B. Neuromodulatory control of spinal locomotor networks via sodium-potassium ATPase pumps. *Scottish Neuroscience Group Meeting*, Aberdeen, Scotland. August 2024.

Sharples, S.A., Burley, S., Sorrell, F.L., Gnanasampanthan, A.G., Chouhan, A., and Miles, G.B. Reduced expression and impaired dynamic function of sodium-potassium pumps in Amyotrophic Lateral Sclerosis. *Scottish Dementia Research Consortium*. Glasgow, Scotland. May 2022.

Sharples, S.A. State-dependent neuromodulation of mammalian spinal networks. *Scottish Neuroscience Group.* Heriot-Watt University, Edinburgh, Scotland. August 2019.

Provincial (6)

Sharples, S.A., and Whelan (2017). Modulation of rhythmic networks - when state matters. *Ontario Exercise Neuroscience*. University of Guelph, Guelph, ON, June 2017.

Sharples, S.A., Humphreys, J.M., Dhoopar, S.A., Delaloye, N., Krajacic, A., Nakanishi, S.T., and Whelan, P.J. Dopaminergic contribution to locomotion in the neonatal mouse. *Alberta Motor Control*, Jasper, AB, Sept 2013.

Sharples, S.A., Gould, J.A., Vandenberk, M.S., and Kalmar, J.M. Mechanisms of upstream failure contributing to increased sense of effort with fatigue. *Alberta Motor Control*, Kananaskis, AB, September 2012.

Sharples, S.A., Gould, J.A., Vandenberk, M.S., and Kalmar, J.M. Fatigue: It's in your head. *Ontario Exercise Physiology*, Barrie, ON, January 2012.

Sharples, S.A., and Kalmar, J.M. Modulation of cortical excitability and interhemispheric inhibition prior to a planned voluntary unimanual contraction. *Ontario Exercise Neuroscience*, Wilfrid Laurier University, Waterloo, ON, June 2011.

Sharples, S., Almeida, Q.J., and Kalmar, J. The role of the supplementary motor area in mirror movements in Parkinson's disease. *Ontario Exercise Physiology*, Barrie, ON, January 2010.

Regional/ Institutional (4)

Dalrymple, A.N., **Sharples, S.A.,** Mushahwar, V.K., and Whelan, P.J. The characterization of spontaneous spinal cord motor activity using supervised machine learning. *University of Alberta Annual Neuroscience and Mental Health Research Day*, Edmonton, AB, March 2017.

Sharples, S.A. and Whelan. Modulation of rhythmic network activity- when state matters. *Hotchkiss Brain Institute Research in Progress*, Calgary, AB, February 2017.

Sharples, S.A. and Whelan. Mechanisms of modulation exerted by dopamine on spinal locomotor networks of the neonatal mouse. *Hotchkiss Brain Institute Research in Progress*, Calgary, AB, March 2015.

Sharples, S.A., Gould, J.A., Vandenberk, M.S., and Kalmar, J.M. Cortical contributions to altered sense of effort following fatigue. *Southern Ontario Motor Behaviour Symposium*, Wilfrid Laurier University, Waterloo, ON, May 2012.

Poster Presentations (41)

International (34)

Sharples, S.A. and Miles, G.B. Spinal neurons with a biophysical signature consistent with a gamma motoneuron identity emerge during the third week of postnatal development in mice. *Society for Neuroscience*, Chicago, IL, USA. Nov 2024.

Sharples, S.A., and Miles, G.B. Developmental mechanisms for firing hysteresis in motoneurons of the postnatal mouse. *Society for Neuroscience*, Washington, DC, USA. Nov 2023.

Nisbet, S., **Sharples, S.A.**, and Miles, G.B. Neuromodulation of sodium potassium ATPase pumps dynamically regulate mammalian spinal networks. *Society for Neuroscience*, Washington, DC, USA. Nov 2023.

Calabrese, G.B., Broadhead, M.J., Schardien, K., Incognito, A., Lane, M.A., Wilson, R.J., **Sharples, S.A.**, and Miles, G.B., Modulation of Breathing by spinal cholinergic pathways. *Society for Neuroscience*, Washington, DC, USA. Nov 2023.

Schardien, K.A., Randelman, M.L., Fortino, T.A., *Calabrese, G.B.,* Hall, A.A., **Sharples, S.A.**, Miles, G.B., and Lane, M.A. Effects of respiratory training on pre-phrenic interneurons after spinal cord injury. *Society for Neuroscience*, Washington, DC, USA. Nov 2023

Sharples, S.A., and Miles, G.B. Functional diversification and establishment of motoneuron recruitment during postnatal development in mice. *Motor Control: Spinal Circuits & Beyond.* St Andrews, UK. June 2023. *Society for Neuroscience*, Washington, DC, USA. Nov 2023.

Sharples, S.A. and Miles, G.B. Fast motoneurons are not just 'big' slow motoneurons: roles for active properties in maintaining the orderly recruitment of motoneuron subtypes. *Benzon Symposium.* Copenhagen, DK, September 2023.

Nisbet, S., **Sharples, S.A.**, and Miles, G.B. Neuromodulatory control of spinal networks via sodium potassium ATPase pumps. *Motor Control: Spinal Circuits & Beyond.* St Andrews, UK. June 2023.

Sharples, S.A. and Miles, G.B. M-type potassium currents shape recruitment of motoneuron subtypes. *Society for Neuroscience*, San Diego, CA, USA. Nov 2022.

Burley, S, **Sharples, S.A.***, Bonthron, C., Broadhead, M.J., Gnanasampanthan, A.G., Morrison, K., Miles, G.B., and Sleeman, J. Protein methylation as a mechanism for cellular damage in motor neuron disease. *Society for Neuroscience*, San Diego, CA, USA. Nov 2022. * Presenting Author.

Calabrese, G.B., Broadhead, M.J., Motherwell, L., **Sharples, S.A.**, and Miles, G.B. Cholinergic modulation of respiratory-related motor output. *Society for Neuroscience.* San Diego, CA, USA. Nov 2022.

Milla-Cruz, J.J., **Sharples, S.A**., Korogod, S., Parker, J., *Lognon, A.P*., Cheng, N., Shonak, A., Cymbalyuk, G.S., and Whelan, P.J. A glutamatergic electrically coupled spinal network for the generation of episodic rhythmicity. *Society for Neuroscience*, San Diego, CA, USA. Nov 2022.

Nisbet, S., **Sharples, S.A.**, and Miles, G.B. Neuromodulation of sodium potassium ATPase pumps dynamically regulate mammalian spinal networks. *ATP1a3 in Disease*. Edinburgh, Scotland, October 2022.

Burley, S, **Sharples, S.A.**, Bonthron, C., Broadhead, M.J., Gnanasampanthan, A.G., Morrison, K., Miles, G.B., and Sleeman, J. Protein methylation as a mechanism for cellular damage in motor neuron disease. *International Motoneuron Society Meeting.* Banff, AB, Canada, June 2022.

Calabrese, G.B., Broadhead, M.J., Motherwell, L., **Sharples, S.A.**, and Miles, G.B. Cholinergic modulation of respiratory-related motor output. *International Motoneuron Society Meeting.* Banff, AB, Canada, June 2022.

Cymbalyuk, G., Parker, J., Erazo Toscano, R.J., **Sharples, S.A.,** Ellingson, P., Vargas, A., Masino, M.A., Whelan, P.J., and Calabrese, R.L. Dynamic mechanisms underlying continuous and episodic bursting patterns produced by a half-center oscillator. *Society for Neuroscience*, Virtual Symposium, November 2021.

Sharples, S.A. and Miles, G.B. Persistent and hyperpolarization-activated inward currents shape fast and slow motoneuron recruitment during postnatal development. *Society for Neuroscience*, Chicago, IL, USA, Nov 2021.

Sorrell, F.L., *Hooper, F.W.*, **Sharples, S.A.**, Akkuratov, E.E., Aperia, A., and Miles, G.B. Effects of the rapid-onset-parkinsonism gene mutation T613M on spinal motor networks in mice. *ATP1a3 in Disease*. Stockholm, Sweden, September 2021.

Parker, J., **Sharples, S.A.**, Vargas, A., *Lognon, A.P*., Whelan, P.J., and Cymbalyuk, G. The role of hyperpolarization-activated current in the production of episodic bursting by a half-center oscillator. *Computational Neuroscience Meeting.* Virtual Symposium, July 2021.

Sharples, S.A., Sorrell, F.L., and Miles, G.B. Intrinsic property maturation drives the orderly recruitment of slow and fast lumbar motoneurons during postnatal development. *Society for Neuroscience*, Chicago, IL, USA, October 2019.

Sorrell, F.L., **Sharples, S.A.,** Sillar, K.T., and Miles, G.B. Post discharge activity of spinal motoneurons across postnatal development in mice. *Society for Neuroscience*, Chicago, IL, USA, October 2019.

Lognon, A.P., **Sharples, S.A**., and Whelan, P.J. The effects of T-type antagonists on the genesis of motor activity in the neonatal mouse spinal cord. *Society for Neuroscience*, Chicago, IL, USA, October 2019.

Sharples, S.A., Burma, N.E., Leduc-Pessah, H., Jean-Xavier, C., and Whelan, P.J. Complex dopamine receptor interactions exert diverse modulation on spinal networks of the neonatal mouse. *Society for Neuroscience*, Washington, D.C., USA, November 2017. DOI: 10.13140/RG.2.2.17191.09125

Sharples, S.A. and Whelan, P.J. Modulation of rhythmic activity in mammalian spinal networks is dependent on excitability state. *Motor Systems Symposium*, Salk Institute, La Jolla, CA, USA, November 2016.

Mayr, K.A., Jean-Xavier, C., **Sharples, S.A.,** and Whelan, PJ. Dopaminergic modulation of stepping behaviour in adult decerebrate mice. *Federation of European Neuroscience*, Copenhagen, Denmark, July 2016.

Sharples, S.A., and Whelan, P.J. Dopamine exerts concentration-dependent bidirectional modulation and evokes state-dependent NMDA-mediated rhythmicity in motor networks of the neonatal mouse spinal cord. *Society for Neuroscience*, Chicago, IL, USA, October 2015. DOI: 10.1314/RG.2.2.31925.27368.

Mandadi, S., Hong, P., Leduc-Pessah, H., Ejdrygiewicz, J., **Sharples, S.A,** Trang, T., and Whelan, P.J. Role of bradykinin in the modulation of sensorimotor function in the neonatal mouse spinal cord. *Society for Neuroscience*, Washington, D.C., USA, November 2014.

Sharples, S.A., *Osachoff, N.*, and Whelan, P.J. A new method for detection of spontaneous rhythmic activity from ventral roots of the neonatal mouse isolated spinal cord. *Society for Neuroscience*, Washington, D.C., USA November 2014.

Sharples, S.A., Humphreys, J.M., Mayr, K., Krajacic, A., Dhoopar, S.A., Delaloye, N., Nakanishi, S.T., and Whelan, P.J. Dopaminergic contribution to locomotion in the neonatal and adult mouse. *Society for Neuroscience*, San Diego, California, USA, November 2014.

Sharples, S.A., Humphreys, J.M., Dhoopar, S.A., Delaloye, N., Krajacic, A., Mayr, K., Nakanishi, S.T., and Whelan, P.J. Dopaminergic contribution to locomotion in the neonatal and adult mouse. *Motor Systems Symposium*, Salk Institute, La Jolla, CA, USA, November 2013.

Sharples, S.A., Gould, J.A., Vandenberk, M.S., and Kalmar, J.M. Cortical mechanisms of supraspinal fatigue and sense of effort. *Society for Neuroscience*, New Orleans, Louisiana, USA, November 2012.

Sharples, S.A., and Kalmar, J.M. Modulation of cortical excitability and inhibition prior to a voluntary unimanual contraction. *Society for Neuroscience*, Washington D.C., November 2011.

Sharples, S.A., Almeida, Q.J., and Kalmar, J.M. The role of the supplementary motor area in interhemispheric and intracortical inhibition within the human motor cortex. *Society for Neuroscience*, San Diego, CA, Nov 2010.

National (5)

Goh, Q., Shay-Winkler, K., Crone, S.A., **Sharples, S.A.**, Cornwall, R. Neurogenesis Imperfecta: Fetal susceptibility to brachial plexus injury is associated with prenatally identifiable genetic variation in axon structure and development. *POSNA Annual Meeting,* Las Vegas, NV, USA, May 2025.

Löer, C., **Sharples, S.A.,** MccAffery, P., and Miles, G.B. Non-genomic modulation of spinal circuits and neuronal excitability by retinoic acid receptors in the postnatal mouse spinal cord. *Scottish Neuroscience Group Meeting*, Aberdeen, Scotland. August 2024.

Broadhead, M.J., Butler, E., **Sharples, S.A.**, Hughes, D., Meehan, C., Grant, S., and Miles, G.B. The Honeycomb Synapse: The nanostructure of the knee-jerk reflex synapse. *Scottish Neuroscience Group Meeting*, Aberdeen, Scotland. August 2024.

Sharples, S.A., and Whelan, P.J. Dopamine exerts concentration-dependent bidirectional modulation and evokes state-dependent rhythmicity in motor networks of the neonatal mouse spinal cord. *Canadian Neuroscience*, Vancouver, BC, May 2015.

Sharples, S.A., Almeida, Q.J. and Kalmar, J.M. Cortical mechanisms of mirror activation in Parkinson's disease. *Canadian Neuroscience*, Toronto, ON, May 2013.

Regional/Institutional (5)

Calabrese, G.B., Lin, M., Incogneto, A., Wilson, R.J., Zagoraiou, L., **Sharples, S.A.***[+], and Miles, G.B.[+], Philippidou, P. [+]**.** A cholinergic spinal pathway for the amplification of breathing. *Kentucky Spinal Cord and Head Injury Research Trust Symposium.* Louisville, KY, USA. May 2024. *Selected for Data Blitz

Sharples, S.A., Burma, NE, Leduc-Pessah, H., Jean-Xavier, C., and Whelan, P.J. Complex dopamine receptor interactions exert diverse modulation on spinal networks of the neonatal mouse. *Faculty of Veterinary Medicine Research Symposium*, Calgary, AB, February 2018.

Lognon, A.P., **Sharples, S.A.** and Whelan, P.J. Contribution of T-type calcium channels to locomotor network function. *Hotchkiss Brain Institute Summer Student Symposium*, Calgary, AB, April 2016.

Sharples, S.A. and Whelan, P.J. Dopamine exerts concentration-dependent bidirectional modulation and evokes state-dependent NMDA-mediated rhythmicity in motor networks of the neonatal mouse spinal cord. *Hotchkiss Brain Institute Research Day,* Calgary, AB, May 2016.

Sharples, S.A., and Kalmar, J.M. Modulation of cortical excitability and interhemispheric inhibition prior to a voluntary unimanual contraction. *Muscle Health Awareness Day*, York University, Toronto, ON, May 2011.

Research Grants (8)

RS MacDonald Charitable Trust Neurophotonics **(£5,000 GBP)** **Principal Investigator** **2022-2023**
Co-Investigator: Dr. Sarah Burley, University of St Andrews
Shining light on intracellular sodium homeostasis in Amyotrophic Lateral Sclerosis
Funding was obtained to adopt fluorescent sodium sensors to study homeostatic control of intracellular sodium in spinal motoneurons and determine roles for Alpha-3 subunit dysfunction in ALS.

Wellcome Trust Institutional Strategic Support Fund **(£25,036 GBP)** **Principal Investigator** **2021-2022**
(Grant code: 204821/Z/16/Z), University of St Andrews
Deciphering a novel spinal circuit for breathing control
Competitive funding supporting salary to dissect the roles of V0c interneurons in the control of breathing.

St Andrews Restarting Research Fund **(£15,282 GBP)** **Co-Investigator** **2020-2021**
Principle Investigator: Prof. Gareth Miles, University of St Andrews
Defining the roles of a novel signalling peptide in the regulation of spinal cord circuits that control movement.
Competitive funding provided by the University of St Andrews to springboard return to research during the COVID-19 pandemic. Funds obtained were used to procure experimental reagents, pharmacological agents, consumable resources, and re-derive a genetically modified mouse line, to study the physiological role of a novel signalling peptide present at c-bouton synapses in the control of spinal motor circuits.

Scottish Dementia Research Consortium Early Career Researcher Fund (SDRC-ECR-21) **(£2,490 GBP)** **Principal Investigator** **2020-2021**
Co-Investigator: Dr. Sarah Burley, University of St Andrews
Competitive funding aimed at helping Early Career Researchers whose work had been directly affected by the COVID-19 pandemic and subsequent lockdown. Funds obtained were used to procure reagents and consumable resources to springboard in vitro experiments studying the contribution of sodium-potassium ATPase pumps to dysfunction in motoneurons derived from pluripotent stem cells obtained from human patients with ALS.

Carnegie Research Incentive Grant (RIG009814) **(£14,016 GBP)** **Principal Investigator** **2020-2021**
University of St Andrews
Deciphering spinal circuit components for the control of breathing
This project aims to expand our tool kit to study spinal circuits for movement. I will adopt and establish novel in vitro and in vivo approaches to interrogate the function of spinal circuits that control breathing in mice in health and disease and will lead to the generation of key pilot data for future grant submission.

Tenovus Scotland (T20-09) **(£83,014 GBP)** **Co-Investigator** **2020-2023**
Principle Investigator: Prof. Gareth Miles, University St Andrews
Harnessing spinal circuits to facilitate respiratory recovery following spinal cord injury in mice
The goal of this project is to interrogate the anatomical connectivity and functional roles of cervical V0c interneurons in breathing circuits. In collaboration with Michael Lane (Drexel University), this fundamental understanding will be applied to a mouse model of spinal cord injury (SCI) to reveal mechanisms of neuroplasticity that contribute to the therapeutic benefits of respiratory training and could be targeted to improve outcomes following SCI.

Wellcome Trust Institutional Strategic Support Fund **(£15,640 GBP)** **Principal Investigator** **2020-2021**
University of St Andrews
Whole body plethysmography to interrogate spinal circuits for breathing in mice
Funding was obtained to procure a whole-body plethysmograph to record breathing in mice while manipulating the activity of spinal interneurons using genetic tools currently deployed in the Miles Lab. This will provide key insight into the functional role of spinal interneurons in the control of breathing.

Scottish Neurological Research Fund **(£14,920 GBP)** **Principal Investigator** **2019-2020**
Co-Investigators: Dr. Sarah Burley and Prof. Gareth Miles, University of St Andrews

Bridging the gap from rodent to humans to understand pre-symptomatic mechanisms of motoneuron dysfunction in ALS

The goal of this project is to determine the contribution of the sodium-potassium ATPase pump to changes in motoneuron excitability during pre-symptomatic stages of ALS. This project makes use of electrophysiological approaches in genetic mouse models and human motoneurons derived from induced pluripotent stem cells from patients harbouring the C9orf72 mutation.

Fellowships and Awards (23)

International (3)

Royal Society Newton Alumni Follow on Funding (**AL/24100009**)	**(£5,901 GBP)**	**2024-2025**
Royal Society Newton International Fellowship (**NIF\R1\180091**)	**(£113,200 GBP)**	**2019-2021**
Society for Neuroscience Trainee Professional Development Award	**($1,000 USD)**	**2017**

National (5)

Guarantors of Brain Travel Award	**(£1000 GBP)**	**2023**
CIHR - Postdoctoral Fellowship (PDF) (**202012MFE - 459188 - 297534**)	**($150,000 CAD) - Accepted**	**2022-2025**
NSERC - Postdoctoral Fellowship (PDF) (**PDF – 517295 – 2018**)	**($90,000 CAD) - Declined**	**2019-2021**
NSERC - Doctoral Postgraduate Scholarship (**PGSD3 - 443069 - 2013)**	**($63,000 CAD)**	**2013-2016**
NSERC - Industrial Postgraduate Scholarship (IPS-1)	**($42,000 CAD)**	**2010-2012**

Provincial (1)

Alberta Innovates - Health Solutions	**($128,000 CAD)**	**2014-2018**

Regional/Institutional (14)

University of Calgary Neuroscience Graduate Award	**($1,200 CAD)**	**2018**
Bonvicini Graduate Scholarship in ALS Neuroscience	**($6,000 CAD)**	**2017-2019**
Arun Anbazhagan Award	**($1,000 CAD)**	**2015**
J.B. Hyne Research Innovation Award	**($500 CAD)**	**2015**
Eyes High Learn from the Best Award	**($2,500 CAD)**	**2013**
Arun Anbazhagan Award	**($1,000 CAD)**	**2013**
Canadian Neuroscience Association Travel Award	**($500 CAD)**	**2013**
Marine Biological Laboratories Tuition Award	**($3,200 USD)**	**2013**
Eyes High Raise Your Game Award	**($5,200 CAD)**	**2013**
Achievers in Medical Science Graduate Recruitment Scholarship	**($25,000 CAD)**	**2012**
Dr. T. Chen Fong Doctoral Scholarship	**($128,000 CAD)**	**2012-2016**
Dean's Scholarship	**($15,000 CAD)**	**2010-2012**
Graduate Entrance Scholarship	**($3,000 CAD)**	**2010**
Deans' List Scholarship	**($1,000 CAD)**	**2008-2010**

Collaborators

Active (9)

Andrew Stuart	University of Kentucky	USA	2024-Present
Andrew Jones	Miami University	USA	2024-Present
Polyxeni Philippidou	Case Western Reserve	USA	2023-Present
Greg Pearcey	Memorial University	Canada	2022-Present
Richard Wilson	University of Calgary	Canada	2022-Present
Peter McCaffery	University of Aberdeen	Scotland	2022-Present
Michael Lane	Drexel University	USA	2019-Present
Laskaro Zagoraiou	University of Athens	Greece	2019-Present
Gennady Cymbalyuk	Georgia State University	USA	2019-Present
Patrick Whelan	University of Calgary	Canada	2018-Present

Past (7)

Siddharthan Chandran	Edinburgh University	Scotland	2019-2021
Ying Zhang	Dalhousie University	Canada	2018-2020
Glen Baker	University of Alberta	Canada	2016-2020
Nicole Burma	University of Calgary	Canada	2016-2020
Ashley Dalrymple	University of Alberta	Canada	2016-2019
Heather Leduc-Pessah	University of Calgary	Canada	2017-2018
Stefan Clemens	East Carolina University	USA	2014-2015

Service, Leadership and Outreach

Academic Service

Editorial Board Member (1)

Frontiers in Neural Circuits	Review Editor	**2020-Present**

Peer Review (20)

Cell Reports (2), Journal of Physiology (4), eLife (1), Frontiers in Neuroscience (5), Current Biology (1), Neuroscience (1), Applied Physiology, Nutrition and Metabolism (1), Brain Structure and Function (1), Journal of Neurophysiology (2), Experimental Brain Research (1), International Journal of Exercise Science (2)

Grant Review Committees (5)
UKRI Biotechnology and Biological Sciences Research Council (2024), French Association for ALS Research (2024), Branch out Neurological Foundation (2024), Canadian Institute for Health Research (2022-2025), Austria Science Fund (2021)

Chaired Conference Sessions
'Ascending & Descending Control of Movement' – Motor Control: Spinal Circuits and Beyond. St Andrews, United Kingdom. June 2023

Conference Organization Committees

Motor Control: Spinal Circuits and Beyond	University of St Andrews	**2022-2023**
Ontario Exercise Physiology	Wilfrid Laurier University	**2012**
Ontario Exercise Neuroscience	Wilfrid Laurier University	**2011**

University Service

Ohio River Control of Breathing and SCI Journal Club	Coordinator	**2024-Present**
University of St Andrews Spinal Cord and Movement Group	Coordinator	**2019-2023**
University of St Andrews EDI Committee	Postdoc Rep	**2019-2021**
University of St Andrews Psychology and Neuroscience	Postdoc Rep	**2019-2021**
Hotchkiss Brain Institute Graduate Education Committee	Graduate Student Rep	**2016-2018**
Hotchkiss Brain Institute Student Liaison	Student Liaison	**2016, 2017**
Hotchkiss Brain Institute Research Day	Scientific Program Judge	**2016, 2017**
Hotchkiss Brain Institute Mentorship Program	Graduate Student Mentor	**2014-2018**
Hotchkiss Brain Institute Trainee Organization (HBITO)	Orientation Committee	**2014-2018**
	Social Committee	**2014-2018**
	Outreach Committee	**2016-2017**
	Education Chair	**2015-2016**
	Education Committee	**2014-2015**
Neural Systems and Behaviour Journal Club	Coordinator	**2013-2016**
Wilfrid Laurier University Divisional Council	Graduate Student Rep	**2010-2011**

Invited Guest Speakers

Ronaldo Ichiyama	Leeds University	**2022**
Corey Baimel	New York University	**2021**
Ciaran Murphy-Royal	University of Montreal	**2021**
Hillel Adesnik	University of California Berkley	**2017**
Andre Fenton	New York University	**2017**
Ivan Soltesz	Stanford University	**2016**
Marc Freeman	University of Massachusetts	**2016**
Bradley Kerr	University of Alberta	**2015**
Eve Marder	Brandeis University	**2015**

Outreach

University of St. Andrews Science Discovery Day	Demonstrator	**2019**
Calgary Youth Science Fair	HBITO Representative	**2018**
Calgary Public Library "Think Big" Series	HBITO Representative	**2017-2018**
HBITO Outreach Committee	Committee member	**2016-2017**
Telus Spark Hack Your Brain Night	Organization Committee	**2016**
Calgary Brain Bee	Organization Committee	**2015-2018**

Teaching Experience

University Course Guest Lectures (13)

Gain control in spinal motor circuits **(90 mins)**	University of St Andrews	**2023**
Gain control in spinal motor circuits **(90 mins)**	Wilfrid Laurier University	**2023**
Neuromodulatory control of spinal motor circuits **(90 mins)**	University of British Columbia Okanagan	**2021**
An integrated rodent tool kit to study the dopaminergic control of locomotion **(90 mins)**	University of British Columbia Okanagan	**2021**
Ion channels of excitable membranes (**60 mins)**	University of St. Andrews	**2019**
Active conduction in neurons **(60 mins)**	University of St. Andrews	**2019**
Principles of central pattern generation **(90 mins)**	Wilfrid Laurier University	**2017**
From the Walking Dead to Superman - An introduction to locomotor physiology (**60 mins**)	Mount Royal University	**2016, 2017**
Dopaminergic control of locomotion (**60 mins**)	Mount Royal University	**2016**
Introduction to motor systems neuroscience (**60 mins**)	Mount Royal University	**2015**
Introduction to electrophysiology (**30 mins)**	University of Calgary	**2015**
Introduction to motor systems (**30 mins**)	University of Calgary	**2015**

Teaching Assistantships (4)

KP221: Human Anatomy	Wilfrid Laurier University	**2011**
KP425: Neuromuscular Physiology of Exercise	Wilfrid Laurier University	**2010**
KP122: Biodynamic Aspects of Physical Activity	Wilfrid Laurier University	**2010**
BI238: Introduction to the Histology of Tissues	Wilfrid Laurier University	**2008**

Mentoring Experience

Graduate Students (5)

Kabila Nagaraju (PhD Rotation Student)	Cincinnati Children's Hospital	**2024**
Lauren Ho (MSc Student: **Primary Supervisor**)	University of St Andrews	**2022-2023**
Struan Nisbet (PhD Student: **Co-supervisor**)	University of St Andrews	**2021-2024**
Giulia Benedetta Calabrese (PhD Student: **Co-supervisor**)	University of St Andrews	**2020-2024**
Woodard Hooper (MSc Student: **Co-supervisor**)	University of St Andrews	**2020-2021**

Undergraduate Honours Thesis Students (5)

Carlotta Löer	University of St Andrews	**2023**
Caroline Nachman	University of St Andrews	**2021-2022**
Henry Parle	University of St Andrews	**2020-2021**
Athena Stamper	University of St Andrews	**2019-2020**
Adam Lognon	University of Calgary	**2016-2017**

Undergraduate Summer Studentships (3)

Adam Lognon	University of Calgary	**2016**
Nathan Osachoff	University of British Columbia	**2015**
Jansen Kappen	Calgary Brain Bee	**2015**

Professional Development

Teaching and Mentorship Development

Supervising Postgraduate Students	University of St Andrews	**2023**
Assertiveness Skills	University of St Andrews	**2023**
Diversity for Managers	University of St Andrews	**2023**
HBITO-MRU trainee teaching development exchange*	University of Calgary	**2015-2016**
Developing a Teaching Dossier	University of Calgary	**2016**
Instructional Skills Workshop Certificate	University of Calgary	**2015**
HBI Community Mentorship Program	University of Calgary	**2015**

*** I established and developed an initiative through the HBI and Mount Royal University (MRU) to provide teaching opportunities for University of Calgary graduate students at MRU.**

Competitive Technical Courses

Computational Methods in Neuroscience	Campus Alberta Neuroscience, University of Lethbridge	**2015**
Neural Systems & Behaviour	Marine Biological Laboratory, Woods Hole, MA	**2013**
MatLab Fundamentals	Mathworks, Vancouver, BC	**2013**
fMRI Visiting Fellowship: A Five-Day Intensive Introduction	Athinoula A. Martinos Center for Biomedical Imaging, Boston, MA	**2011**

Skills

Communication: Experience writing a variety of scientific documents including primary research articles, reviews, textbooks, grant/ethics applications, and communication of scientific findings to non-scientific audiences. Experience preparing and executing oral communications to a broad variety of audiences including specialists in my field, general scientific audiences, undergraduates, clinicians, and the public. Repeat-reviewer for 12 academic journals, 5 granting agencies, and editorial experience through the publication of a textbook and as 'Review Editor' for *Frontiers in Neural Circuits.*

Laboratory Research:

Animal: Experience with mouse colony management and establishment of genetically modified mouse lines including polymerase chain reaction assays for identification of genetic mutants. Experienced with rodent surgical procedures, anaesthesia and a C2 hemisection model of spinal cord injury.

Electrophysiology: Expertise with a range of *in vitro* preparations of the neonatal mouse spinal cord and brainstem-spinal cord performing extracellular and intracellular recordings in combination with pharmacology and optogenetics to study locomotor and respiratory systems. Experience using *in situ* preparations of the brainstem and spinal cord to study spinal and respiratory function in adult rodents. Expertise performing single

and paired patch clamp recordings of spinal motoneurons in vitro from mice up to 21 days old and spinal interneurons in vitro from adult mice. Currently learning in vivo terminal and chronic diaphragm electromyography in mice to study respiratory physiology in healthy and spinal cord injured mice.

Imaging and Microscopy: Basic experience in retrograde tracing of neural circuits in vitro and in vivo, immunohistochemistry, and training in bright field, epifluorescence, and confocal microscopy. Currently learning tissue clearing and light sheet microscopy to study intact neural circuits in brain and spinal cord.

Rodent Behaviour: Introductory training in methods used to analyze rodent behaviour to test motor (Open field, balance beam, and Rotarod), sensory (Hargraves' Thermal test and plantar aesthesiometer), and cognitive (Morris Water Maze, elevated plus maze, object recognition) systems.

Transcriptomics: Experience working with and interpreting single cell RNA sequencing datasets in R using the Seurat pipeline.

Human Neurophysiology: Experienced in human neurophysiological techniques and analyses for global and single motor unit activity using surface and intramuscular electromyography. I have experience making these recordings in combination with electrical nerve stimulation to measure spinal excitability and segmental circuitry (H-reflex, reciprocal inhibition, etc.), as well as peripheral transmission (M-wave), and muscle contractile properties (mechanical twitch). I also have four years of experience using transcranial magnetic stimulation (TMS: Single, paired pulse, and repetitive stimulation), stimulating with multiple coils simultaneously in primary and supplementary motor cortices to assess cortical circuitry and excitability in both healthy young, aging, and clinical populations (Parkinson's disease). I also worked as a consultant for Northern Digital Inc. to develop a surface feature based TMS coil tracking system.

Software: Statistical Analysis: Sigmaplot, SPSS, Prism, and Statistica. Data visualization and graphic design: ImageJ, and Adobe Photoshop, Illustrator, and Premier. Electrophysiology Data Acquisition: pClamp, CED Spike2 and Signal. Some training using R and MATLAB for data visualization, signal processing, and analysis.