

Caitlin A. Murphy

· caitlinanmurphy@gmail.com · St. Louis, MO, USA · caitlinamurphy.com ·

CURRENT POSITION

2020-present Postdoctoral Research Associate, Dept. of Anesthesiology, Washington University in St. Louis

EDUCATION

2020 University of Wisconsin
PhD in Physiology
PhD minor in Life Science Communications

2014 University of Wisconsin
BS in Biology, BS in Secondary Science Education, Certificate in Environmental Studies

HONORS AND AWARDS

2020 Student Research Grants Competition – Travel Award, University of Wisconsin
2019 Physiology Travel Award, University of Wisconsin
2018 Honored Instructor Award, University of Wisconsin
2017 Trainee Professional Development Award (TPDA), Society for Neuroscience
2015, 2016 Honorable Mention, NSF Graduate Research Fellowship Program
2014 Honors in the Liberal Arts, College of Letters and Science
2014 Meyerhoff Undergraduate Excellence Award for Leadership, Service, and Scholarship
2014 Peer Mentor Scholarship Award, Biochemistry
2012-2013 Roland W. Zinns, Liebenberg Scholarship for Educators
2009, 2010 Undergraduate Research Scholar
2009-2014 Dean's List, University of Wisconsin

RESEARCH SUPPORT

5T32GM108539-08 – NIH National Institute of General Medical Sciences – Training Program in Anesthesiology Research (08/2021-Present)

University of Wisconsin – Summer Sophomore Research Apprenticeship (06/2010-08/2010) – The effects of Parkinson's disease on swallow and voice function.

This project focused on characterizing and quantifying several measures of sensory and motor deficits (e.g., dysphonia, dysphagia) in patients with Parkinson's disease.

Role: Principal Investigator

RESEARCH EXPERIENCE

2020-present Postdoctoral Research Associate (Advisor: Meaghan Creed)
Department of Anesthesiology, Washington University in St. Louis
Mesolimbic and parabrachial circuit adaptations in chronic pain and addiction
· Conduct *in vivo* and *ex vivo* electrophysiological recordings in mice to assay neural and behavioral responses to noxious stimuli in a mouse model of neuropathic pain
· Use behavioral pharmacology to characterize features of oxycodone addiction

2020 Postdoctoral Research Associate (Advisor: Matthew Banks)

- 2015-2020 Graduate Research Assistant (Advisor: Matthew Banks)
Department of Anesthesiology, University of Wisconsin
Synaptic and network responses to afferent inputs in higher order cortex and their modulation by the volatile anesthetic isoflurane
- Performed whole-cell patch clamp recordings from interneurons and pyramidal cells
 - Investigated cortical circuits using optogenetic and pharmacological manipulations
 - Explored effect of volatile anesthetics on distinct components of cortical circuits
- 2014 Research Assistant (Advisor: David Weimer, Brian Baldo)
La Follette School of Public Affairs, University of Wisconsin
- Conducted multidisciplinary review of literature in neurobiology of addiction and public policy to provide evidence-based recommendations for drug policy
- 2009-2010 Undergraduate Researcher (Advisor: Michael Hammer)
Department of Surgery – Otolaryngology, University of Wisconsin
Sensorimotor deficits of the upper airway in Parkinson's disease
- Compared respiration, phonation, and deglutition between healthy and PD subjects

PUBLICATIONS

Peer-reviewed journal articles

Markovic T, Pedersen CE, Massaly N, Vachez YM, Ruyle B, **Murphy CA**, Abiraman K, Shin JH, Garcia JJ, Yoon HJ, Alvarez VA, Bruchas MR, Creed MC, Morón JA. (2021). Pain induces adaptations in ventral tegmental area dopamine neurons to drive anhedonia-like behavior. *Nature Neuroscience*. 24(11):1601-1613. PMID: 34663957. PMCID: PMC8556343 (Available 2022-05-01)

Murphy C, Matikainen-Ankney B, Chang Y, Copits B, Creed MC. Chapter Nine – Optogenetically-inspired neuromodulation: Translating basic discoveries into therapeutic strategies. In: Moro E, Polosan M, Hamani C, editors. *Emerging Horizons in Neuromodulation: New Frontiers in Brain and Spine Stimulation*. International Review of Neurobiology: Academic Press; 2021.

Ibrahim BA, **Murphy CA**, Muscioni G, Taheri A, Yudintsev G, Kenyon RV, Berger-Wolf T, Banks MI, Llano DA. (2021). Corticothalamic gating of population auditory thalamocortical transmission in mouse. *eLife*. doi: 10.7554/eLife.56645

Sultan ZW, Jaeckel ER, Krause BM, Grady SM, **Murphy CA**, Sanders RD, Banks MI. (2021). Electrophysiological signatures of acute systemic lipopolysaccharide: potential implications for delirium science. *Br J Anaesth*. 126(5):996-1008. PMID: 33648701. PMCID: PMC8132883 (Available 2022-05-01)

Murphy CA, Raz A, Grady SM, Banks MI. (2020). Optogenetic activation of afferent pathways in brain slices and modulation of responses by volatile anesthetics. *J Vis Exp*. doi.org/10.3791/61333

Murphy C, Krause B, Banks M. (2019). Selective effects of isoflurane on cortico-cortical feedback afferent responses in murine non-primary neocortex. *Br J Anaesth*. 123(4):488-496. PMCID: PMC6871270

Krause BM, **Murphy CA**, Uhlrich DJ, Banks MI. (2017). PV+ Cells Enhance Temporal Population Codes but not Stimulus-Related Timing in Auditory Cortex. *Cereb Cortex*. PMCID: PMC6319178

Hentschke H, Raz A, Krause BM, **Murphy CA**, Banks MI. (2017). Disruption of cortical network activity by the general anaesthetic isoflurane. *Br J Anaesth*. 119(4):685-696. PMCID: PMC6172964

Banks MI, **Murphy C**, Sanders RD. (2017). Correlational studies of unconsciousness under anaesthesia: how far can preclinical studies take us?. *Br J Anaesth*. 119(6):1079-1081. PMCID: PMC6172968

Hammer MJ, **Murphy CA**, Abrams TM. (2013). Airway somatosensory deficits and dysphagia in Parkinson's disease. *J Parkinsons Dis.* 3(1):39-44. PMID: PMC3613252

Manuscripts in progress

Matikainen-Ankney BA, Legaria AA, Vachez YM, **Murphy CA**, Pan Y, Schaefer RF, McGrath QJ, Wang JG, Bluit MN, Norris AJ, Creed MC, Kravitz AV. (2022). Enhanced food motivation in obese mice is controlled by D1R expressing spiny projection neurons in the nucleus accumbens. *bioRxiv* 2022.01.12.476057 [Preprint]. doi.org/10.1101/2022.01.12.476057

Murphy C, Chang Y, Pareta R, Li J, Earnest T, Tooley J, Vachez YM, Gereau RW, Copits BA, Kravitz AV, Creed MC. (2021). Modeling features of addiction with an oral oxycodone self-administration paradigm. *bioRxiv* 2021.02.08.430180 [Preprint]. doi.org/10.1101/2021.02.08.430180

Murphy CA, Banks MI. (2020). Cell type-specific effects of isoflurane on two distinct afferent inputs to cortical layer 1. *bioRxiv* 2020.05.08.102913 [Preprint]. doi.org/10.1101/2020.05.18.102913

TALKS

Murphy CA. Brainstem-mesolimbic circuits in nociception. Isthmus Physiology Symposium, University of Wisconsin, via Zoom. 2021 May 27.

Murphy CA. Brainstem-mesolimbic circuits in nociception. Neural Circuits Club, Washington University, via Zoom. 2020 November 09.

Murphy C, Krom A, Bergman H, Redinbaugh M, Warnaby K. Anesthesia effects on forebrain activities: thalamus, basal ganglia, and cortex. Workshop Session, International Conference on Mechanisms of Anesthesia. Xi'an, Shaanxi, China. 2020 March 24-27. [Cancelled due to COVID-19]

Murphy CA. Conscious versus unconscious slices: Disentangling the cortical microcircuit in an ex vivo preparation. Brain and Bagels Seminar, University of Wisconsin. 2019 February 22.

Murphy CA. Modulation of thalamocortical and corticocortical synaptic responses by isoflurane. Physiology Graduate Training Program Seminar, University of Wisconsin. 2018 September 13.

Murphy CA. *Ex vivo* modulation of synaptic responses by anesthetics. Hearing and Donuts Seminar, University of Wisconsin. 2017 October 6.

Murphy CA. Modulation of thalamo-cortical and cortico-cortical synaptic pathways by general anesthetics. Hearing and Donuts Seminar, University of Wisconsin. 2017 January 20.

Murphy CA. Effects of volatile anesthetics on synaptic and network activity in posterior parietal cortex. Physiology Graduate Training Program Seminar, University of Wisconsin. 2016 December 08.

Murphy CA. Inflammatory regulation of inhibitory neuron function and cortical feedback connectivity. Graduate Training Program Seminar, University of Wisconsin. 2015 April 16.

McDaniel S, Martin K, Martin J, Worsham D, **Murphy C**. Student media authorship: Collaborative approaches to foster new literacies and engagement. Teaching and Learning Symposium: Learning, Doing, Being. University of Wisconsin. 2011 May 25.

Murphy CA. The effects of Parkinson's disease on swallow and voice function. University of Wisconsin College of Letters and Science Honors Program Apprenticeship Retreat. Spring Green, WI, USA. 2010 August 10.

POSTER PRESENTATIONS

Murphy CA, Chang Y, Kravitz AV, Creed MC. Brainstem-mesolimbic circuits in nociception. Washington University Annual Neuroscience Retreat; Saint Louis, MO. 2021 September 30.

Murphy CA, Banks MI. Cell type- and pathway-specific effects of isoflurane on optogenetically-evoked responses in cortical brain slices. Gordon Research Conference: Optogenetic Approaches to Understanding Neural Circuits and Behavior; Newry, ME. 2020 July 19-24. [Cancelled due to COVID-19]

Murphy CA, Banks MI. Pathway- and cell type-specific effects of isoflurane on evoked responses in interneurons of non-primary mouse neocortex. Association of University Anesthesiologists, International Anesthesia Research Society Annual Meeting; San Francisco, CA. 2020 May 14-18. [Cancelled due to COVID-19]

Murphy CA, Krause BM, Banks MI. Distinct cellular and network responses to thalamo-cortical versus cortico-cortical L1 input in non-primary neocortex. Society for Neuroscience Annual Meeting; Chicago, IL. 2019 October 22.

Murphy CA, Krause BM, Grady SM, Banks MI. Effect of isoflurane on selectively activated afferent pathways in neocortex. Society for Neuroscience Annual Meeting; Washington D.C. 2017 November 11,14.

Jaeckel ER, Banks MI, **Murphy CA**, Grady SM, Barnard PA, Kaur S, Krause BM, Townsend EA, Sanders RD. The effects of systemic inflammation on murine cortical activity. Society for Neuroscience Annual Meeting; Washington D.C. 2017 November 10.

Murphy CA, Sanders RD, Krause BM, Banks MI. Cortical network activity in posterior parietal cortex following afferent stimulation. Society for Neuroscience Annual Meeting; San Diego, CA. 2016 November 14.

Banks MI, Darracq M, **Murphy CA**, Grady SM, Sanders RD. Wakeful EEG correlates of systemic lipopolysaccharide. Society for Neuroscience Annual Meeting; San Diego, CA. 2016 November 13.

Sipe AP, **Murphy CA**, Darracq M, Sanders RD, Banks MI. A behavioral analysis of the inflammatory response that leads to the onset of delirium in mice. Undergraduate Research Symposium; Madison, WI. 2016 April 14.

Hammer MJ, **Murphy C**, Abrams T. Airway somatosensory deficits and dysphagia in Parkinson's disease. Scientific paper session, Dysphagia Research Society Annual Meeting; San Diego, CA. 2010 March 3-6.

TEACHING EXPERIENCE

2018-2020 Lecturer, Human Physiology and Health, University of Wisconsin
2019 Instructor, Introductory Physics, Engineering Summer Program
2017 Graduate Teaching Assistant, Human Physiology and Health, University of Wisconsin
2017 Graduate Teaching Assistant, Advanced Human Physiology, University of Wisconsin
2016-2019 Tutor, ACT, SAT, MCAT, AP Biology, Chemistry, Calculus; Galin Education
2016 First-year Seminar Instructor, Chadbourne Learning Community, University of Wisconsin
2015 Graduate Teaching Assistant, Introduction to Human Physiology, University of Wisconsin
2015 Graduate Teaching Assistant, Advanced Human Physiology, University of Wisconsin
2014-2015 Tutor, Organic Chemistry, Biochemistry, and Physics, Center for Educational Opportunity
2014 8th grade Science Teacher, Pre-College Enrichment Opportunity Program for Learning Excellence (PEOPLE) Program
2014 Student Teacher, Biology for English Language Learners, Madison West High School
2014 Student Teacher, Introductory Biology, Madison West High School
2013-2015 Teaching Assistant, Introduction to Biochemistry, University of Wisconsin
2013 Student Teacher, 8th Grade Science, Hamilton Middle School
2012 Pre-student Teacher, Biotechnology, Middleton High School

2012 Pre-student Teacher, Introductory Biology, Middleton High School
2012-2013 Facilitator, Peer Learning Team, Introduction to Human Physiology, University of Wisconsin
2011 Facilitator, Peer Learning Association, Introductory Biology

SERVICE & OUTREACH

2021-Present Committee for Real Equity in Anesthesiology, Training, and Education (CREATE)
2018-2020 Workshop facilitator, Equity and Inclusion in ultimate
2014-2020 Coach, Science Olympiad, Hamilton Middle School
2018-2019 Reviewer, Journal of Advanced Student Science
2016 Mentor for undergraduate student research, Introductory Biology, University of Wisconsin
2012-2014 President, Wisconsin Education Association Council - University of Wisconsin chapter
2012-2013 Student Advisory Board to the Dean, Associated Students of Madison, University of Wisconsin
2012-2013 Programs Committee, School of Education, University of Wisconsin
2011-2016 Community Outreach Volunteer, Wisconsin Institutes for Discovery, University of Wisconsin
2011-2012 Outreach Coordinator, Student Wisconsin Education Association, University of Wisconsin

OTHER PROFESSIONAL EXPERIENCE

2012-2015 Foundation Administrator, Ceiba Foundation for Tropical Conservation, Madison, WI
2012-2014 Undergraduate Research Assistant, Cornell University Press, Introduction to the Orchids of Tropical America
2012 Undergraduate Researcher Assistant (Advisor: Joe Meisel), Ceiba Foundation for Tropical Conservation
2012 Science Outreach Intern, Engage Children in Science, Tabuga, Ecuador
2011-2014 Orientation Assistant (Lead in 2014), Center for First-Year Experience, University of Wisconsin

MEMBERSHIPS

2020-present US Association for the Study of Pain (USASP)
2020-present American Physiological Society (APS)
2019-present American Association for the Advancement of Science (AAAS)
2016-2021 Member, Society for Neuroscience (SfN)
2013-2015 Member, National Education Association (NEA)
2013-2015 Member, Wisconsin Education Association Council (WEAC)
2007-2009 Member, International Anesthesia Research Society (IARS)