

Matt Carter, Ph.D.

Department of Biology, Program in Neuroscience
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Scientific Interests

I am interested in the neural basis of innate behaviors, especially eating and sleeping. To study the structure and function of specific neural systems, my lab uses a combination of behavioral and physiological assays, neuroimaging methods (fiber photometry), neuromodulation techniques (optogenetics and chemogenetics), and histological approaches, using mice as a model organism.

Academic Position

Associate Professor (2019–)

Assistant Professor (2013–19)

*Department of Biology, Program in Neuroscience
Williams College, Williamstown, MA*

Appointments: **Inaugural Director, Rice Center for Teaching** (2022–)

Establishing, staffing, and directing a new campus-wide Center for Teaching to provide opportunities for Williams faculty develop their craft of teaching.

Education

Doctor of Philosophy (Ph.D.), Neurosciences (2004–2011)

Stanford University, Stanford, CA

Dissertation: "Optogenetic reverse-engineering of brain sleep/wake circuitry"

Thesis committee: Luis de Lecea (advisor), Karl Deisseroth, Emmanuel Mignot, John Huguenard

Bachelor of Arts (B.A.), Major: Biology (1996–2000)

Whitman College, Walla Walla, WA

Graduated *magna cum laude* with Honors in major study

Research Training

Postdoctoral Fellow, Lab of Dr. Richard Palmiter (2011–2013)

Howard Hughes Medical Institute and Department of Biochemistry

University of Washington, Seattle, WA

Identified a genetically distinct population of neurons in the parabrachial nucleus that regulate appetite suppression using neuroanatomical, optogenetic, and chemogenetic approaches.

Graduate Student and Postdoctoral Fellow, Lab of Dr. Luis de Lecea (2005–2011)

Department of Psychiatry and Behavioral Sciences

Stanford University, Stanford, CA

Demonstrated frequency-dependent effects of modulating hypocretin and locus coeruleus neurons on wakefulness and arousal using optogenetics and electroencephalography techniques.

Research Technician, Lab of Dr. Ellen Covey (2002–2004)

Department of Psychology

University of Washington, Seattle, WA

Produced an original stereotaxic brain atlas of the big brown bat (*Eptesicus fuscus*), identifying relevant anatomical structures within a three-dimensional coordinate system.

Financial Awards

- **NIDDK AREA Grant: 1R15DK105510-02**, National Institutes of Health (2018-21)
"Characterization of the parasubthalamic nucleus as an appetite suppression center."
- **CAREER Award: IOS-1652060**, National Science Foundation (2017-22)
"Bidirectional control of sleep and wakefulness by the hypothalamic arcuate nucleus."
- **NIDDK AREA Grant: 1R15DK105510-01A**, National Institutes of Health (2015-18):
"Determination of how orexigenic AgRP neurons anatomically and functionally interact with anorexigenic PBel CGRP neurons to regulate food intake."
- **Davis Foundation Postdoctoral Fellowship**, Hilda and Preston Davis Foundation (2011-2014)
"Optogenetic investigation of the parabrachial nucleus in food intake."
- **Ruth Kirschstein National Research Service Award (NRSA)**, National Institutes of Health (2008-2011)
"The role of hypocretins in the regulation of stress and arousal."
- **Graduate Research Fellowship (NSF GRF)**, National Science Foundation (2005-2007)

Honors

- **John Hyde Teaching Fellowship**, Williams College (2021-22)
- **Nelson Bushnell '20 Prize for Excellence in Teaching and Writing**, Williams College (*College-wide teaching award*) (2019)
- **Young Investigator Award**, Sleep Research Society (*International award presented to two sleep researchers per year*) (2011)
- **Excellence in Service to Graduate Students Award**, Stanford University School of Medicine (*Presented to one graduate student per year*) (2010)
- **Best Scientific Poster**, Annual retreat of the Stanford Institute for Neuro-Innovation and Translational Neurosciences (2009)
- **Walter J. Gores Award for Excellence in Teaching**, Stanford University (*University-wide teaching award presented to one graduate student per year*) (2008)
- **Excellence in Teaching Award**, Stanford University School of Medicine (*Presented to one graduate student per year*) (2006 and 2007)
- **Phi Beta Kappa**, National Academic Society (2000)
- **Sigma Xi**, National Honorary Science Society (2000)
- **Eugene Marx Service Award**, Whitman College (*Presented to one graduating senior per year*) (2000)
- **Senior Commencement Speaker**, Whitman College (*Chosen by graduating senior class*) (2000)
- **Excellence in Service to Residence Life and Housing**, Whitman College (1999 and 2000)

Publications and Presentations

**Indicates undergraduate student co-author

Peer-Reviewed Research Articles

Hare MT, **Carter ME**, Swoap SJ (2023). Activation of oxytocinergic neurons enhances torpor in mice. *Journal of Comparative Physiology B*. [In Press].

Pauli JL, Chen JY, Basiri ML, Park S, **Carter ME**, Sanz E, McKnight GS, Stuber GD, Palmiter RD (2023). Molecular and anatomical characterization of parabrachial neurons and their axonal projections. *eLife*. 11:e81868.

Kim JH, **Kromm GH, **Barnhill OK, **Sperber J, **Heuer LB, **Loomis S, **Newman MC, **Legan TB, **Han K, **Gulamali F, Jensen K, Funderburk SC, Krashes MJ, **Carter ME (2022). A discrete parasubthalamic nucleus subpopulation plays a critical role in appetite suppression. *eLife* 11:e75470.

Goldstein N, **Levine BJ, **Loy KA, **Duke W, **Meyerson OS, **Jamnik AA, **Carter ME (2018). Hypothalamic neurons that regulate feeding can influence sleep/wake states based on homeostatic need. *Current Biology* 28(23):3736-3747.

Iyer M, **Essner RA, Klingenberg B, **Carter ME (2018). Identification of discrete, intermingled hypocretin neuronal populations. *Journal of Comparative Neurology* 526(18):2937-2954.

Essner RA, **Smith AG, **Jamnik AA, **Ryba AR, **Trutner ZD, **Carter ME (2017). AgRP neurons can increase food intake during conditions of appetite suppression and inhibit anorexigenic parabrachial neurons. *Journal of Neuroscience* 37(36):8678-8687.

Carter ME, Han S, Palmiter RD (2015). Parabrachial calcitonin gene-related peptide neurons mediate conditioned taste aversion. *Journal of Neuroscience* 35(11):4582-4586.

Bonnavion P, Jackson AC, **Carter ME**, de Lecea L (2015). Antagonistic interplay between hypocretin and leptin in the lateral hypothalamus regulates stress responses. *Nature Commun.* 19;6:6266.

Carter ME, Soden ME, Zweifel LS, Palmiter RD (2013). Genetic identification of a neural circuit that suppresses appetite. *Nature* 503(7474):111-114.

Carter ME, Brill J, Bonnavion P, Huerta R, Huguenard J, de Lecea L (2012). Mechanism for hypocretin-mediated sleep-to-wake transitions. *Proc. Natl. Acad. Sci.* 109(39):E2635-44.

Rolls A, Colas D, Adamantidis A, **Carter ME**, Lanre-Amos T, Heller HC, de Lecea L (2011). Optogenetic disruption of sleep continuity impairs memory consolidation. *Proc. Natl. Acad. Sci.* 108(32):13305-10.

Monroy JA, **Carter ME**, Miller KE, Covey E (2011). Development of echolocation and communication vocalizations in the big brown bat, *Eptesicus fuscus*. *J. Comp. Physiol.* 197(5):459-467.

Carter ME, Yizhar O, Nguyen H, Chikahisa S, Adamantidis A, Deisseroth K, de Lecea L (2010). Tuning arousal with optogenetic modulation of locus coeruleus neurons. *Nature Neurosci.* 13(12):1526-33.

Carter ME, Adamantidis A, Ohtsu H, Deisseroth K, de Lecea L (2009). Sleep homeostasis modulates hypocretin-mediated sleep-to-wake transitions. *J. Neurosci.* 29(35):10939-49.

Review Articles, Book Chapters, and Commentary

Carter ME. Homeostasis. In Kirby ED, Glenn MJ, Sandstrom NJ, Williams CL (Eds.): [Introduction to Behavioral Neuroscience](#). Houston, TX: OpenStax [In Press].

Carter ME (2022). Neuroethology: Regulation of pre-sleep behaviors. *Current Biol* 32(4):R160-162.

Adamantidis AR, Schmidt MH, **Carter ME**, Burdakov D, Peyron C, Scammell TE (2020). A circuit perspective on narcolepsy. *Sleep* 43(5).

Vicent MA, **Mook CL, **Carter ME. (2018). POMC neurons in heat: A link between warm temperatures and appetite suppression. *PLoS Biol.* 16(5):e2006188.

Carter ME, **Goldstein N, **Loy K, **Smith A (2016). Research Methods in Neuroscience. In [Encyclopedia of Theory in Psychology](#). SAGE Publications, New York, NY.

Graebner A, **Iyer M, **Carter ME (2015). Understanding how discrete populations of hypothalamic neurons orchestrate complicated behavioral states. *Front. Systems Neurosci.* 9:111.

Carter ME, de Lecea L, Adamantidis A (2013). Functional wiring of hypocretin/orexin and norepinephrine neurons: implications for arousal. *Front. Behav. Neurosci.* 7(43).

Adamantidis A, **Carter ME**, de Lecea L (2013). Optogenetic control of arousal neurons. *In* Thorpy M, Shaw P, Tafti M (Eds.): The Genetic Basis of Sleep and Sleep Disorders. Cambridge University Press, New York, NY.

de Lecea L, **Carter ME**, Adamantidis A (2012). Shining light on wakefulness and arousal. *Biol. Psych.* 71(12):1046-52.

Carter ME, de Lecea L (2011). Optogenetic investigation of neural circuits in vivo. *Trends Mol. Med.* 17(4):197-206.

Carter ME, Adamantidis A, de Lecea L (2011). The hypocretins/orexins: master regulators of arousal and hyperarousal. *In* Baumann CR, Bassetti CL, Scammell TE (Eds.): Narcolepsy: Pathophysiology, Diagnosis, and Treatment. Springer, New York, NY.

de Lecea L, **Carter ME** (2011). Optical control of neuronal activity. *In* Encyclopedia of Life Sciences (ELS). John Wiley & Sons, Ltd., Chichester, United Kingdom.

Adamantidis A, **Carter ME**, de Lecea L (2010). Optogenetic deconstruction of sleep-wake circuitry in the brain. *Front. Mol. Neurosci.* 2:31.

Carter ME, de Lecea L (2009). Hyperarousal and post-traumatic stress disorder: a role for the hypocretin system. *In* Shiromani PJ, Kean TM, LeDoux JE (Eds.): Post-Traumatic Stress Disorder. Humana Press, New York, NY.

Carter ME, Schaich Borg J, de Lecea L (2009). The brain hypocretins and their receptors: mediators of allostatic arousal. *Curr. Opin. Pharmacol.* 9(1)39-45.

Carter ME, Brunet A (2007). FOXO transcription factors. *Curr. Biol.* 17:R113-114.

Scientific Books

Carter ME, **Essner RA, **Goldstein N, **Iyer M (2022). Guide to Research Techniques in Neuroscience, 3rd Ed. Academic Press (Elsevier), San Diego, CA. 400 pages.

Surveys all common techniques used in neuroscience research, from molecular genetics to human brain imaging. New from previous editions: content about fluorescent biosensors, CRISPR/Cas9 genome editing, brain organoid culture models, etc.; over 150 new full-color figures.

Carter ME (2020). Designing Science Presentations: A Visual Guide to Figures, Papers, Slides, Posters, and More, 2nd Ed. Academic Press (Elsevier), San Diego, CA. 360 pages.

Demonstrates how to use fundamental principles of design to create and deliver high-impact presentations. New from first edition: 25 updated chapters, hundreds of new figures.

Carter ME, Shieh JC (2015). Guide to Research Techniques in Neuroscience, 2nd Ed. Academic Press (Elsevier), San Diego, CA. 388 pages.

Surveys all common techniques used in neuroscience research, from molecular genetics to human brain imaging. New from first edition: new chapter on neuromodulation techniques; 14 updated chapters; over 150 new full-color figures.

Carter ME, Covey E, Eds. (2015). Basic Electrophysiological Methods. Oxford University Press, New York, NY. 227 pages.

Surveys common electrophysiological techniques and provides instructions for scientists setting up new experiments.

Carter ME (2013). Designing Science Presentations: A Visual Guide to Figures, Papers, Slides, Posters, and More. Academic Press (Elsevier), San Diego, CA. 360 pages.

Demonstrates how to use fundamental principles of design to create and deliver high-impact presentations.

Carter ME, Shieh JC (2010). Guide to Research Techniques in Neuroscience. Academic Press (Elsevier), San Diego, CA. 376 pages.
Surveys all common techniques used in neuroscience research, from molecular genetics to human brain imaging. Also translated into Japanese.

Recent Conference Poster Presentations

Kaegi Z, **Carter ME (November 2023). Noxious predator odors cause activation of appetite-suppressing paraventricular nucleus (PVN) neurons. *52th Annual Meeting of the Society for Neuroscience*, Washington D.C.

Kim JH, **Kromm GH, **Barnhill OK, **Han K, **Heuer LB, **Loomis S, **Newman MC, **Sperber J, , **Legan TB, **Gulamali F, Funderburk SC, Krashes MJ, **Carter ME (November 2021). An essential role for a discrete paraventricular nucleus subpopulation in appetite suppression. *50th Annual Meeting of the Society for Neuroscience, virtual meeting*.

Barnhill O, **Sperber J, **Kim J, **Gulamali F, **Legan T, **Carter ME (October 2019). Tachykinin-1-expressing neurons in the paraventricular nucleus signal food availability and suppress food consumption. *49th Annual Meeting of the Society for Neuroscience*, Chicago, IL.

Cohn E, **Odenigbo K, **Gulamali F, Swoap S, **Carter ME (July 2019). Asprosin administration promotes wakefulness and blunts torpor bouts in mice. *49th Annual Meeting of the Society for Neuroscience*, Chicago, IL.

Barnhill O, **Sperber J, **Kim J, **Gulamali F, **Legan T, **Carter ME (July 2019). Characterization of the Paraventricular Nucleus (PVN) as an appetite suppression center. *Society for the Study of Ingestive Behavior*, Utrecht, Netherlands.

Goldstein N, **Loy KA, **Levine BJ, **Duke W, **Meyerson OS, **Jamnik AA, **Carter ME (November 2017). Hypothalamic arcuate nucleus neurons that regulate energy homeostasis can also influence sleep/wake behavior. *47th Annual Meeting of the Society for Neuroscience*, Washington D.C.

Lehman S, **O'Sullivan R, **Carter ME (November 2017). TRH neurons respond to cold exposure but stimulation is not sufficient to increase body temperature. *47th Annual Meeting of the Society for Neuroscience*, Washington D.C.

Essner RA, **Smith AG, **Jamnik AA, **Ryba AR, **Trutner ZD, **Carter ME (May 2017). AgRP neurons overcome appetite suppression by directly inhibiting the paraventricular nucleus. *Keystone Meeting: Neuronal Control of Appetite, Metabolism, and Weight*, Copenhagen, Denmark.

Vicent MA, **Mook CL, **Carter ME Swoap SJ (April 2017). Optogenetic activation of AgRP neurons lengthens and deepens daily torpor in the mouse. *Experimental Biology Annual Meeting*, Chicago, IL.

Essner RA, **Smith AG, **Carter ME (November 2016). Stimulation of AgRP neurons is sufficient to eliminate the effects of appetite-suppressing compounds. *46th Annual Meeting of the Society for Neuroscience*, San Diego, CA.

Essner RA, **Smith AG, **Carter ME (July 2016). Stimulation of AgRP neurons is sufficient to eliminate the effects of appetite-suppressing compounds. *Gordon Research Conference: Optogenetic Approaches to Understanding Neural Circuits and Behavior*, Newry, ME.

Loy K, **Goldstein N, **Carter ME (January 2016). AgRP neurons can disrupt sleep/wake architecture and cause deficits in rapid eye movement (REM) sleep. *49th Annual Winter Conference on Brain Research*, Breckenridge, CO.

Smith AG, **Carter ME (January 2016). The effects of AgRP neuron stimulation on food intake during appetite suppression. *49th Annual Winter Conference on Brain Research*, Breckenridge, CO.

Iyer M, **Carter ME (October 2015). Identification of discrete, intermingled hypocretin neuronal populations. *45th Annual Meeting of the Society for Neuroscience*, Chicago, IL.

Carter ME, Palmiter RD (March 2013). A neural circuit from the parabrachial nucleus to the amygdala suppresses food intake. *Keystone Meeting: Neuronal Control of Appetite, Metabolism, and Weight*. Banff, Alberta, CA.

Carter ME Brill J, Huguenard JR, de Lecea L (October 2010). Optogenetic dissection of functional interactivity between hypocretin and locus coeruleus neurons. *41st Annual Meeting of the Society for Neuroscience*, San Diego, CA.

Carter ME, Yizhar O, Nguyen H, Adamantidis A, Deisseroth K, de Lecea L (December 2009). Frequency-dependent effects of optogenetic stimulation of noradrenergic neurons in sleep transitions. *48th Annual Meeting of the American College of Neuropsychopharmacology*, Hollywood, FL.

Carter ME, Yizhar O, Nguyen H, Adamantidis A, Deisseroth K, de Lecea L (October 2009). Downstream effectors of hypocretin neurons: optogenetic investigation of the locus coeruleus in sleep and wakefulness. Meeting: *Can New Tools Revolutionize Understanding of Hypothalamic Neural Circuits?* Janelia Farm Research Campus, Ashburn, VA.

Carter ME, Yizhar O, Nguyen H, Adamantidis A, Deisseroth K, de Lecea L (October 2009). Optogenetic modulation of the locus coeruleus in sleep and wakefulness. *40th Annual Meeting of the Society for Neuroscience*, Chicago, IL.

Carter ME, Adamantidis A, Ohtsu H, Deisseroth K, de Lecea L (June 2009). Sleep homeostasis modulates hypocretin-mediated sleep-to-wake transitions. *23rd Annual Meeting of the Associated Professional Sleep Societies*, Seattle, WA.

Recent Invited Oral Presentations—Scientific Research

“To Sleep or Eat? Neural Circuitry of Competing Behaviors” (December 2023). *Iniciativa Proxima Annual Symposium*, Porto Allegra, Brazil.

“To Sleep or Eat? Neural Circuitry of Competing Behaviors” (October 2023). *Department of Integrative Physiology and Neuroscience, Washington State University*, Pullman, WA.

“To Sleep or Eat? Neural Circuitry of Competing Behaviors” (October 2023). *UT Health, University of Texas*, Houston, TX.

“A critical role for the parasubthalamic nucleus in appetite suppression” (July 2023). *Society for the Study of Ingestive Behaviors*, Portland, OR.

Plenary Lecture: “To eat or sleep: Neural circuitry of competing behaviors” (May 2023). *Central Virginia Society for Neuroscience 2023 Annual Meeting*, Harrisonburg, VA.

“A critical role for the parasubthalamic nucleus in appetite suppression” (January 2023). *Winter Conference on Brain Research*, Snowbird, UT.

“A critical role for the parasubthalamic nucleus in appetite suppression” (October 2022). *Yale University, Neuroscience Seminar Series*, New Haven, CT.

“A critical role for the parasubthalamic nucleus in appetite suppression” (October 2022). *Northwestern University, Division of Endocrinology and Metabolism*, Chicago, IL.

"A critical role for the parasubthalamic nucleus in appetite suppression" (May 2022). *Monell Chemical Sciences Center*, Philadelphia, PA.

"Characterization of the parasubthalamic nucleus as an appetite suppression center" (April 2022). *University of Texas Southwestern, Center for Hypothalamic Research*, Dallas, TX.

"Characterization of the parasubthalamic nucleus as an appetite suppression center" (March 2022). *University of Connecticut, Department of Physiology and Neurobiology Seminar Series*, Storrs, CT.

"Characterization of the parasubthalamic nucleus as an appetite suppression center" (January 2021). *Brown University, Department of Molecular and Cellular Biology Seminar Series*, Providence, RI.

"Hypothalamic neurons that regulate feeding can influence sleep/wake states based on homeostatic need" (November 2020). *National Science Foundation CAREER symposium* virtual meeting.

"Hypothalamic neurons that regulate feeding can influence sleep/wake states based on homeostatic need" (January 2020). *Winter Conference on Brain Research*, Big Sky, MT.

"To Sleep or Eat? Neural Circuitry of Competing Behaviors" (November 2019). *The Obesity Society*, Las Vegas, NV.

"Characterization of the Parasubthalamic Nucleus as an Appetite Suppression Center" (October 2019). *Kallyope*, New York, NY.

"Characterization of the Parasubthalamic Nucleus as an Appetite Suppression Center" (April 2019). *Neuroimaging and Modulation in Obesity and Diabetes Research, National Institute of Diabetes and Digestive and Kidney Diseases*, Bethesda, MD.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (March 2019). *Ramon y Cajal Institute*, Madrid, Spain.

"Identification of discrete, intermingled hypocretin neuronal subpopulations" (September 2018). *7th International Narcolepsy Symposium*, Beverley, MA.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (April 2018). *Institute for Diabetes, Obesity, and Metabolism, Perelman School of Medicine, University of Pennsylvania*, Philadelphia, PA.

"The role of inputs to the parabrachial nucleus in appetite and appetite suppression" (December 2017). *BIDMC Endocrinology Grand Rounds, Harvard Medical School*, Boston, MA.

"Why am I hungry? Interplay between appetite-stimulating and appetite-suppressing brain systems" (December 2017). *Westfield State University*, Westfield, MA.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (August 2017). *European Chemoreception Research Organization, Wellcome Genome Campus*, Cambridge, U.K.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (March 2017). *1st Annual Meeting of the Western Massachusetts Chapter of the Society for Neuroscience*, Amherst, MA.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (February 2017). *Department of Human Genetics, Emory University*, Atlanta, GA.

"Interplay between appetite-stimulating and appetite-suppressing neuronal populations" (February 2017). *National Institute of Diabetes and Digestive and Kidney Disorders*, Bethesda, MD.

"AgRP neurons can increase food intake during conditions of appetite suppression by inhibiting the parabrachial nucleus" (January 2017). *Winter Conference on Brain Research*, Big Sky, MT.

"Dissecting the neural basis of appetite and appetite suppression" (November 2016). *Graduate Program in Neuroscience and Behavior*, University of Massachusetts, Amherst, MA.

"Dissecting the neural basis of appetite and appetite suppression" (October 2016). *Department of Physiology*, University of California, San Francisco, CA.

"Dissecting the neural basis of appetite and appetite suppression" (July 2016). *Wadsworth Center, New York State Department of Health*, Albany, NY.

"Effects of AgRP neuron stimulation on arousal and activity in arousal-related nuclei" (January 2016). *Winter Conference on Brain Research*, Breckenridge, CO.

"An appetite suppression center in the brainstem parabrachial nucleus" (October 2015). *Department of Psychology*, University of Illinois, Chicago, Chicago, IL.

"Shining light on the neuroscience of hunger and fullness" (October 2015). *8th Chris Comer Undergraduate Neuroscience Lecture*, Undergraduate Program in Neuroscience, University of Illinois, Chicago, Chicago, IL.

"Effects of AgRP neuron stimulation on arousal and activity in arousal-related nuclei" (August 2015). *Gordon Research Conference: Frontiers in Catecholamine Function from Synapses to Disease*, Newry, ME.

"Genetic identification of a neural circuit that suppresses appetite" (June 2014). *Department of Molecular Pharmacology*, Albert Einstein College of Medicine, Yeshiva University, New York, NY.

"Genetic identification of a neural circuit that suppresses appetite" (June 2014). *Department of Neuroscience*, Mount Sinai Medical School, New York, NY.

"Genetic identification of a neural circuit that suppresses appetite" (June 2014). *National Institute on Drug Abuse (NIDA)*, Baltimore, MD.

"Genetic identification of a neural circuit that suppresses appetite" (January 2014). *Winter Conference on Brain Research*, Breckenridge, CO.

"Genetic identification of a neural circuit that suppresses appetite" (December 2013). *Douglas Institute, McGill University*, Montreal, Canada.

"Shining light on wakefulness and arousal using optogenetics" (July 2012). *21st Annual Meeting of the International Behavioral Neuroscience Society (IBNS)*, Kailua-Kona, HI.

Recent Invited Oral Presentations—Teaching, Outreach, and Professional Development

"Designing Science Presentations" (January 2023). *Winter Conference on Brain Research*, Snowbird, UT.

"Designing Science Presentations" (October 2022). *School of Public Health*, Yale University, New Haven, CT.

"Designing Science Presentations" (November 2020). *American Society for Pharmacology and Experimental Therapeutics* virtual meeting.

"Active learning strategies in STEM courses" (January 2020). *Winter Conference on Brain Research*, Big Sky, MT.

"Strategies for designing and delivering a scientific presentation" (July 2019). *Wadsworth Center, New York State Department of Health, Albany, NY.*

"The Science of Sleep and the Art of Productivity" (January 2018). *TED^x North Adams, North Adams, MA.*

"Strategies for designing and delivering a scientific presentation" (September 2017). *Department of Pharmacology, Mount Sinai Medical School, New York, NY.*

"Providing opportunities for undergraduates to experience anonymous peer review" (July 2017). *Faculty for Undergraduate Neuroscience Workshop, Chicago, IL.*

"Strategies for designing and delivering a scientific presentation" (July 2017). *Wadsworth Center, New York State Department of Health, Albany, NY.*

"Designing effective presentations" (April 2017). *Experimental Biology Annual Meeting, Chicago, IL.*

"The neuroscience behind a good night's sleep" (January 2017). *Brain talk town hall lecture, 50th Annual Winter Conference on Brain Research, Big Sky, MT.*

"The promise of sleep" (December 2016). *University of Washington Department of Educational Outreach, Seattle, WA.*

"Balancing research and teaching at a liberal arts college" October 2016). *Stanford University Graduate Program in Neuroscience, Stanford, CA.*

"Strategies for designing and delivering a scientific presentation" (July 2016). *Wadsworth Center, New York State Department of Health, Albany, NY.*

"The neuroscience behind a good night's sleep" (October 2014). *Sigma Xi Lecture, Williams College, Williamstown, MA.*

"What scientists can learn from designers: 10 simple strategies to improve scientific communication and presentation" (June 2014). *Department of Molecular Pharmacology, Albert Einstein College of Medicine, Yeshiva University, New York, NY.*

"What scientists can learn from designers: 10 simple strategies to improve scientific communication and presentation" (June 2014). *Department of Pharmacology, Mount Sinai Medical School, New York, NY.*

"What scientists can learn from designers: 10 simple strategies to improve scientific communication and presentation" (July 2013). *Janelia Farm Research Campus, Ashburn, VA.*

"The promise of sleep" (April 2012). *University of Washington Department of Educational Outreach, Seattle, WA.*

Teaching

NSCI 201: Neuroscience

Williams College: Fall 2022, 2023

Course Objectives: To learn the fundamental concepts of neurophysiology, neuroanatomy, and neural circuits in vertebrate organisms; to learn the methods and logic by which scientists study the nervous system and to propose experiments to answer open questions; to gain skills performing neuroscience experiments in histology, neurophysiological recordings, and analysis of behavior.

Biology 205: Physiology

Williams College: Spring 2015, 2016, 2019, 2020, 2021, 2024

Course Objectives: To learn the fundamental mechanisms by which animals regulate their internal environments and maintain homeostasis; to practice testing hypotheses by performing physiological experiments and analyzing quantitative data using statistics; to gain writing skills by writing formal laboratory reports and clear descriptions of physiological mechanisms; to experience and practice scientific peer review of written work.

Biology 311: Neural Systems and Circuits

Williams College: Fall 2013-2015, 2017, 2018, 2019, 2020

Course Objectives: To learn the major neural systems that regulate sensory, motor, homeostatic, and cognitive brain functions in mammals; to read and synthesize cutting-edge papers in systems neuroscience; to perform an independent research project using systems neuroscience techniques; to gain writing skills by writing an original literature review; to experience and practice scientific peer review of manuscripts.

Biology 412: Neural and Hormonal Basis of Hunger

Williams College: Spring 2018

Course Objectives: To learn the neural and hormonal systems that regulate appetite in mammals by reading the primary literature; to develop skills in critically reading, analyzing, and discussing primary literature; to design original scientific experiments to solve open scientific problems; to gain skills in scientific writing and anonymous peer review.

Neuroscience 401: Topics in Neuroscience

Williams College: Spring 2014, 2023

Course Objectives: To understand, discuss, and critique contemporary papers in neuroscience; to design and communicate scientific experiments; to experience and practice scientific peer review of research proposals.

Neurobiology 227: Understanding Techniques in Neuroscience

Stanford University 2005-2009; University of Washington 2012-2013

Course Objective: To survey all commonly used neuroscience techniques so that students can understand and evaluate methods used in any neuroscience paper, talk, or poster.

Research Trainees and Mentorship

Honors Thesis Students (Williams College)

- **Alyana Granados** (2022-23): "Anatomical and functional connectivity between agouti-related peptide (AgRP)-expressing neurons and the paraventricular nucleus (PVN)."
- **Madiha Irshad** (2022-23): "Investigating POMC neuron firing patterns during sleep and wakefulness in sated mice."
- **Maxwell Song** (2022-23): "Characterization of AgRP neural activity across sleep state transitions in food-deprived mice."
- **Zoe Kaegi** (2022-23): "Noxious predator odorants cause activation of appetite-suppressing paraventricular nucleus (PVN) neurons."
- **Faris Gulamali** (2020-21): "Characterization of AgRP neuron activity across the sleep/wake cycle in food-deprived mice."
- **Kenneth Han** (2020-21): "Real-time characterization of tachykinin-1- (Tac1)-expressing neuron activity in the paraventricular nucleus based on food accessibility."
- **Sarah Willwerth** (2020-21): "The effect of sleep on agouti-related peptide (AgRP) neural activity."
- **Lauren Heuer** (2019-20): "Anatomical characterization of the paraventricular nucleus (PVN)."
- **Grace Kromm** (2019-20): "Functional characterization of tachykinin-1-expressing neurons in the paraventricular nucleus in appetite suppression."

- **Sierra Loomis** (2019-20): "Stimulation and mapping of corticotropin-releasing hormone (CRH) neurons in the parasubthalamic nucleus (PSTN)."
- **Matt Newman** (2019-20): "Exploring the effects of inhibiting the parasubthalamic nucleus (PSTN) on food intake in mice."
- **Max Stukalin** (2019-20): "Characterization of AgRP neural activity across the sleep/wake cycle in sated mice."
- **Olivia Barnhill** (2018-19): "Tachykinin-1-neurons in the parasubthalamic nucleus (PSTN) suppress appetite."
- **Erin Cohn** (2018-19): "Asprosin administration during the inactive period increases wakefulness."
- **Kene Odenigbo** (2018-19): "Asprosin administration blunts torpor bouts in mice."
- **Heidi Halvorsen** (2017-18): "Hypothalamic neurons that regulate food intake and energy homeostasis are active during torpor."
- **Jacob Sperber** (2017-18): "Characterization of the parasubthalamic nucleus as an appetite suppression center."
- **Maria Vicent Allende** (2016-17): "Optogenetic stimulation of AgRP neurons lengthens and deepens torpor in mice."
- **Will Duke** (2016-17): "Food restriction is sufficient to increase wakefulness and decrease the quality of sleep."
- **Sara Lehman** (2016-17): "Paraventricular TRH neurons respond to cold exposure but stimulation is not sufficient to increase body temperature."
- **Rachel O'Sullivan** (2016-17): "Stimulation of paraventricular hypothalamic TRH neurons is insufficient to increase metabolic function."
- **Rachel Essner** (2015-16): "Stimulation of AgRP neurons eliminates the effects of appetite suppressing compounds."
- **Brian Levine** (2015-16): "AgRP neuron stimulation is sufficient to decrease the quantity and quality of sleep in the absence of peripheral hunger cues."
- **Conor Mook** (2015-16): "Stimulation of hypothalamic AgRP or POMC neurons deepens and lengthens torpor in mice."
- **Nitsan Goldstein** (2014-15): "AgRP neuron stimulation during wakefulness decreases REM sleep during subsequent sleep."
- **Kelsey Loy** (2014-15): "AgRP neuron stimulation during sleep increases sleep fragmentation and decreases REM sleep."
- **Alison Smith** (2014-15): "The effects of AgRP neuron stimulation on food intake during appetite suppression."
- **Allison Graebner** (2013-14): "Mapping the relevant downstream projections from the organum vasculosum of the laminae terminalis (OVLT)."
- **Manasi Iyer** (2013-14): "Identification of discrete, intermingled hypocretin (Hcrt) neuronal subpopulations."

Independent Study Students, Summer Researchers, and Research Assistants (Williams College)

- **Molly Blakslee** (Research Assistant, Spring 2023)
- **Katie McKenna** (Research Assistant, Spring 2023)
- **Brennan Lee** (Summer 2020)
- **Sarah Willwerth** (Summer 2020)
- **Jake Bingaman** (Summer 2019)
- **Grace Kromm** (Summer 2019)
- **Sierra Loomis** (Summer 2019)
- **Max Stukalin** (Summer 2019)
- **Kenny Han** (Summer 2018; Research Assistant, Spring 2018–)
- **Jessica Kim** (Independent Study, Fall 2018–Spring 2019)

- **Faris Gulamali** (Research Assistant, Spring 2018–)
- **Olivia Barnhill** (Summer 2018)
- **Erin Cohn** (Summer 2018)
- **Kene Odenigbo** (Summer 2018)
- **Jack Page** (Independent Study, Spring 2018)
- **Jordan Lipsom** (Research Technician, Fall 2017-Spring 2018)
- **Theresa Legan** (Research Assistant, Fall 2014-Spring 2017)
- **Heidi Halvorsen** (Independent Study, Fall 2016 and Spring 2017)
- **Adam Jamnik** (Independent Study, Fall 2016 and Spring 2017)
- **Natalie Bernstein** (Independent Study, Fall 2015 and Spring 2016)
- **Olivia Meyerson** (Independent Study, Fall 2015 and Spring 2016)
- **Will Duke** (Summer 2016)
- **Rachel Essner** (Summer 2015)
- **Brian Levine** (Summer 2015)
- **Conor Mook** (Summer 2015)
- **Anna Ryba** (Summer 2014)
- **Zoe Trutner** (Summer 2014)

Professional Memberships

- **Society for Neuroscience** (2007-present)
- **Faculty for Undergraduate Neuroscience** (2016-present)
- **Society for the Study of Ingestive Behaviors** (2019-present)

Residential College Living

Resident Director, Jewett Hall, Whitman College (2000-2002)

- Responsible for the community, social atmosphere, and culture of respect within the largest residence hall on campus (180 first-year students)
- Directly hired, trained, supervised, and evaluated a staff of seven Resident Assistants and six Student Academic Advisors, encouraging teamwork and excellence in job performance
- Led training sessions in counseling skills, fostering a sense of community, and promoting an atmosphere of acceptance and respect

Resident Assistant and Senior Resident, Anderson Hall, Whitman College (1998-1999)

- Responsible for the well-being, community, and social adjustment of 20-30 first-year students
- Fostered an atmosphere of respect for diversity and appreciation for students of different ethnic, cultural, and socioeconomic backgrounds
- Worked closely with individuals who required special attention due to homesickness, relationship problems, drug and alcohol abuse, sexual misconduct, learning disabilities, and sexual identity
- Received 100+ hours of training in counseling skills, conflict management, and student development theory necessary to address the needs of undergraduates

Leadership and Service

Scientific Service:

Chair: 2024 Gordon Research Conference: "The Hypothalamus." Bates College, ME.

Vice Chair: 2022 Gordon Research Conference: "The Hypothalamus." Ventura Beach, CA.

Ad Hoc Peer-Review:

- **Peer-Reviewer for Scientific Journals:** American Journal of Physiology, Annals of Public Health and Research, Behavioral Neuroscience, Bioessays, Biological Psychology, Cell Reports, Clinical Chemistry, Current Biology, eLife, eNeuro, FASEB Journal, Frontiers in Behavioral Neuroscience, Frontiers in Neuroscience, Journal of Comparative Neurology, Journal of Neurochemistry, Journal of Neuroscience, Nature, Nature Communications, Nature Neuroscience, Physiology and Behavior, PLoS Biology, Proceedings of the National Academy of Sciences, Scientific Reports, Science Signaling, Sleep, Translational Psychiatry
- **Granting Agencies:** National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) K-awards panel, National Science Foundation (NSF) ad hoc reviewer, Army Research Office (ARO), Austrian Science Fund (FWF), German Research Foundation (DFG), Diabetes Research Center of the University of Washington

Williams College

- **Inaugural Director, Joseph Lee Rice III 1954 Center for Teaching** (2022-)
- **Ad hoc Committee on a Center for Teaching and Learning** (Spring 2021)
- **First3 Coordinator** (2021-) Faculty development coordinator for new faculty within first three years
- **Chair, Institutional Animal Care and Use Committee** (2020-)
- **“Teach Summer Team”** (Summer 2020)
- **Ad hoc Committee on Academic Contingency Planning during COVID-19** (Spring 2020)
- **Strategic Planning Working Group on Student Learning** (2019-20)
- **Faculty Steering Committee** (2015-2016, 2017-19)
- **Faculty Affiliate, Women’s Varsity Ice Hockey** (2015-)
- **Science Executive Committee** (2014-2015)
- **Committee on Undergraduate Life** (2014-2015)
- **Undergraduate Residence Life Advisory Committee** (2014-2015)
- **Faculty Review Panel** (2014-15)

Stanford University

- **Student Representative**, Neuroscience Program Admissions and Program Committee (2005-2007)
- **Student Representative**, Stanford Medical School Committee on Graduate Admissions and Policy (2007)

Whitman College (Alumni)

- **Class Representative** (2000-present)
- **Class Reunion Chair** (2005, 2015, 2020)

Community Service

- **President, Williamstown Community Chest** (2023-)
- **Board Member, Williamstown Community Chest** (2020-2023)