

Brandon L. Roberts, Ph.D.

University of Massachusetts - Amherst
Department of Psychological Brain Sciences
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Current Position

University of Massachusetts
Postdoctoral Fellow

Amherst, Massachusetts
April 2020 – Present

Education

Washington State University
Ph.D., Neuroscience
B.S., Neuroscience

Pullman, Washington
2009 – 2015
2005 – 2009

Research Experience

Postdoctoral Fellow

University of Massachusetts – Amherst

March 2020 – Present
Dr. Ilia Karatsoreos

- Determined physiological mechanisms by which time of day and circadian disruption, both during development and adulthood, mediate neural function in the prefrontal cortex.
- Trained students in slice and cell-culture electrophysiology, aiding in projects investigating astrocyte regulation of oxidative stress, and rhythms of synaptic inputs in hippocampal and cortical neurons. Instrumental in starting up Dr. Karatsoreos' newly relocated lab, including budgeting, ordering, and organizing lab equipment, with near autonomous freedom designing our electrophysiology facility.

Postdoctoral Fellow

Oregon Health & Science University
Oregon National Primate Research Center

March 2015 – March 2020
*Dr. Paul Kievit; Dr. Kevin Grove**

- Developed a project discovering that in hypothalamic proopiomelanocortin neurons, leptin resistance induced by developmental overnutrition can be rescued with an overnight fast. This work also identified how early life overnutrition impacts synaptic development and leptin signaling.
- Under a Novo Nordisk drug discovery partnership (~30% time effort), I identified therapeutic targets for diabetes and obesity by utilizing non-human primate genomic and proteomic data, alongside patent, clinical trial, and safety reports. Validated targets with pharmacology, histology, and behavior techniques. Piloted related electrophysiology experiments using cultured whole- and dissociated- pancreatic islets.

*Original mentor left for industry during first year resulting in a ~1 year mentorship gap

Graduate Student

Washington State University

Fall 2009 – Winter 2015
Dr. Suzanne Appleyard

- Implemented patch-clamp electrophysiology, surgical, cell culture, and behavioral techniques to investigate the role of glucose and serotonin in feeding circuitry, identifying a mechanism by which serotonin and glucose control glutamate release from vagal afferents onto hindbrain catecholamine neurons.
- Integral in maintaining a new metabolic system and provided input to the company that resulted in critical cage design modifications. Aided in moving lab to a new building and gave input on the building design that corrected a major flaw and was incorporated into the final build.

Research Assistant

Washington State University

Fall 2007 – Fall 2009
Dr. Sue Ritter

- Implemented metabolic testing, behavioral paradigms, DEXA scanning, stereotaxic surgery, immunohistochemistry, and PCR to study the role of leptin sensitive neurons in endogenous feeding rhythms, which led to a collaborative publication and new grant aims.

Grants

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| IONs Inspiration Award; \$15,000 <i>Impact of traumatic brain injury on glial and neural function in the hippocampus</i> | 2022 – Present |
| Sleep Research Society Small Research Grant; \$5,000 <i>Impact of maternal circadian disruption on sleep and PFC function in offspring</i> | 2021 – Present |

Pending Grants

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| NIH NIDDK R01; DK136109-01 (A1) Co-Investigator <i>Investigating the functional consequences of chronic postnatal overnutrition on hypothalamic circuits</i> | <i>Prepared for Cycle 1 resubmission</i> |
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Fellowships & Awards

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| SSIB Postdoctoral New Investigator Travel Award | 2018 |
| Poncin Research Fellowship (Two-year stipend) <i>Obesity alters serotonin signaling on hindbrain catecholamine neurons</i> | 2013 – 2015 |
| SSIB Graduate student New Investigator Travel Award | 2014 |
| Pfizer Student Research Poster Presentation Award | 2011 |

Publications

- Brandon L. Roberts**, Jeixin Wang, and Ilia N. Karatsoreos. *Circadian desynchronization attenuates information throughput independent of daily rhythms in prefrontal cortex pyramidal neurons.* [Preprint] bioRxiv Version 2022-05-27 doi:10.1101/2022.01.27.478010 (*Under review*)
- Brandon L. Roberts**, Eric Kim, Katherine Tennant, Sarah Lindsley, and Paul Kievit. *Fibroblast growth factor -1 activates neurons in the arcuate nucleus and dorsal vagal complex.* Frontiers in Endocrinology, 2021. DOI: 10.3389/fendo.2021.772909
- Brandon L. Roberts** and Ilia Karatsoreos. *Brain-body responses to chronic stress: a brief review.* Faculty Reviews, 2021. 10:83. DOI: 10.12703/r/10-83
- Brandon L. Roberts**, Baylin J. Bennett, Camdin M. Bennett, Julie M. Carroll, Louise S. Dalbøge, Colin Hall, Wafa Hassouneh, Kristy M. Heppner, Melissa A. Kirigiti, Sarah R. Lindsley, Katherine G. Tennant, Cadence A. True, Andrew Whittle, Anitra C. Wolf, Charles T. Roberts, Jr., Mads Tang-Christensen, Mark W. Sleeman, Michael A. Cowley, Kevin L. Grove, Paul Kievit. *Reelin is modulated by diet-induced obesity and has direct actions on arcuate proopiomelanocortin neurons.* Molecular Metabolism, 2019. S2212-8778 (19)30147-4.
- Brandon L. Roberts**, Camdin M. Bennett, Julie M. Carroll, Sarah R. Lindsley, and Paul Kievit. *Early overnutrition alters synaptic signaling and induces leptin resistance in arcuate proopiomelanocortin neurons.* Physiology & Behavior, 2019. 206: 166-174.
- Brandon L. Roberts**, Mingyan Zhu, Huan Zhao, Crystal Dillon, and Suzanne M. Appleyard. *High glucose increases action potential firing of catecholamine neurons in the nucleus of the solitary tract by increasing spontaneous glutamate inputs.* American Journal of Physiology, 2017. 313(3):R229-R239.
- Brandon L. Roberts***, Ran Ji Cui*, Huan Zhao, Mingyan Zhu, and Suzanne M. Appleyard. *Serotonin activates catecholamine neurons in the Solitary Tract Nucleus by increasing spontaneous glutamate inputs.* Journal of Neuroscience, 2012. 32(46):p. 16530-8. *Co-primary, contributed equally
- Ai-Jun Li, Michael F. Watter, Marjolein T. Oostrom, Bethany R. Smith, Qing Wang, Thu T. Dinh, **Brandon L. Roberts**, Heiko T. Jansen and Sue Ritter. *Leptin-sensitive neurons in the arcuate nuclei contribute to endogenous feeding rhythms.* American Journal of Physiology, 2012. 302(11):R1313-26
- Ran Ji Cui, **Brandon L. Roberts**, Huan Zhao, Michael C. Andresen, and Suzanne M. Appleyard, *Opioids inhibit visceral afferent activation of catecholamine neurons in the solitary tract nucleus.* Neuroscience, 2012. 2222:181-190.

Manuscripts In Preparation

Brandon L. Roberts, Iliia N. Karatsoreos. *Transcriptional and physiological regulation of synaptic function in the PFC is time of day dependent.* (Prepared for submission)

Brandon L. Roberts, Walker Sorensen, and Iliia N. Karatsoreos. *Maternal circadian desynchronization disrupts sleep and PFC function in adult offspring.* (In Preparation)

Invited Presentations

1. **Brandon L. Roberts**, Iliia N. Karatsoreos. (2022) Impact of circadian desynchronization on neural function in the prefrontal cortex. MCB Postdoc Showcase. Amherst, MA (Invited speaker).
2. **Brandon L. Roberts**, Iliia N. Karatsoreos. (2022) Circadian desynchronization alters information throughput in the prefrontal cortex. Society for the Study of Biological Rhythms. Amelia Island, FL (Invited speaker).

Oral Abstracts

1. **Brandon L. Roberts**, N. Iliia Karatsoreos. (2022) *Electrophysiological mechanisms of daily rhythms in the prefrontal cortex.* SRBR Global Talk Series. Virtual.
*One of Top 6 presenters
2. **Brandon L. Roberts**, Camdin Bennett, and Paul Kievit. (2018) *Developmental and adult overnutrition alter synaptic inputs and leptin signaling onto proopiomelanocortin neurons in the arcuate nucleus of the hypothalamus.* Society for the Study of Ingestive Behavior; Bonita Springs, FL.
3. **Brandon L. Roberts**. (2016) *Target validation and outcomes.* Novo Nordisk Executive Steering Committee. Marriot Hotel, Portland, OR. *Nature of this presentation is confidential due to a non-disclosure agreement.
4. **Brandon L Roberts**, Mingyan Zhu, Suzanne M. Appleyard. (2014) *Low glucose decreases action potential firing of catecholamine neurons in the nucleus of the solitary tract indirectly via a presynaptic 5-HT_{3R} dependent mechanism;* Society for the Study of Ingestive Behavior; Seattle, WA.

Poster Abstracts

1. **Brandon L. Roberts**, Walker Sorensen, Iliia N. Karatsoreos. (2022) *Impact of maternal circadian disruption on sleep and neural function in adult offspring.* Int. Society for Develop. Psychobiology. San Diego, CA
*Voted best virtual postdoc iPoster
2. Jiexin Wang, **Brandon L. Roberts**, Iliia N. Karatsoreos. (2022) *Synaptic protein levels and physiological activity in primary cortical neurons are influenced by time of day.* Society for Neuroscience. San Diego, CA
3. Carey E. Dugan*, **Brandon L. Roberts***, Iliia N. Karatsoreos, and Shelly R. Peyton. (2022) *Impact of traumatic brain injury on glial and neural function in the hippocampus.* Interdisciplinary Neuroscience Conference. Amherst, MA. *co-presenters
4. **Brandon L. Roberts**, Iliia N. Karatsoreos. (2021) *Neurophysiology of daily rhythms in the prefrontal cortex of male and female mice.* Neuroscience and Technology Poster Conference. Amherst, MA.
5. **Brandon L. Roberts**, Eric Kim, and Paul Kievit. (2019) *Synaptic Actions of Fibroblast Growth Factor -1 in the Hypothalamus and Dorsal Vagal Complex.* ObesityWeek. Las Vegas, NV.
6. Eric Kim*, and **Brandon L. Roberts**. (2020) *Combating Diabetes: Synaptic mechanisms of FGF1 in hypothalamic and hindbrain neurons.* Intel International Science and Engineering Fair. Beaverton, OR.
7. **Brandon L. Roberts**, Camdin Bennett, Louise Dalboege, Baylin Bennett, Kevin Grove and Paul Kievit. (2017) *Reelin protein is increased in the hypothalamus of diet-induced obesity (DIO) mice and has direct actions on arcuate proopiomelanocortin (POMC) neurons.* Keystone in Keystone, CO.
8. **Brandon L. Roberts** and Suzanne M. Appleyard. (2013) *Low glucose decreases action potential firing of catecholamine neurons in the nucleus of the solitary tract indirectly by reducing glutamate input.* Society for Neuroscience in San Diego, CA.

9. Zhao H., **Roberts B.L.***, Appleyard S.M. (2013) *Catecholamine and non-catecholamine neurons have different mechanisms to facilitate synaptic transmission in the nucleus of the solitary tract in mice*. Society for Neuroscience in San Diego, CA. (*Presenter; Original author not able to attend)
10. **Brandon L. Roberts**, Ran Ji Cui, Huan Zhao, Mingyan Zhu, and Suzanne M. Appleyard. (2011) *5-HT₃ agonists activate catecholamine neurons in the solitary tract nucleus of the brainstem*. Society for Neuroscience in Washington DC.
11. **Brandon L. Roberts**, X.J. Li, R.J. Cui, S.M. Appleyard. (2010) *Glucose sensitivity in the nucleus of the solitary tract*. CVM research symposium. Pullman, WA.
12. **Brandon L. Roberts**, Ai Jun Li, Thu Dinh, Sue Ritter. (2009) *Neuropeptide Y Receptor-Expressing Neurons Play a Critical Role in Feeding Behavior and Metabolic Function*; CVM Research Symposium, Pullman, WA.

Teaching Experience

Guest Lecturer (7 contact hours; 155 students)

Fall 2022

Biological Psychology 330 – *University of Massachusetts*

Dr. Ilia Karatsoreos

- Deliver core content and discussion questions on development of the nervous system, affective/emotional systems, and associated disorders, in a large undergraduate classroom setting.

Guest Instructor (multi-week)

2019 – 2020

Immersive Neuroscience; *Beaverton Health & Science School*

Steve Lent

- Co-created a curriculum and taught neuroscience to middle school students, including sheep brain dissections, making model neurons using electronic components, and other hands-on activities.

Instructor

Summer 2016 – 2018

From Bread to Brain; *Saturday Academy*

- Engaged STEM high school students by developing one-day, multi-day and weeklong courses on the biology, anatomy, physiology and behavior of emotional systems, metabolic function, and nutrition.

Co-instructor

Fall 2013 – Spring 2014

Affective Neuroscience 409/509; *Washington State University*

Dr. Jaak Panksepp

- Worked under the guidance and mentorship of the late Dr. Panksepp, a pioneer in *Affective Neuroscience*. Constructed lectures, exams, and assignments to teach undergraduate and graduate students about the origins and mechanisms of human and animal emotional systems.

Teaching Assistant

Fall 2013

Principles of Neurophysiology 430; *Washington State University*

Dr. James Peters

- Prepared and directed laboratory activities, assignments, and exams focused on the exploration of principles underlying cellular, sensory, motor, and integrative functions of the nervous system.

Teaching Assistant

Spring 2011 – Spring 2012

Neuroanatomy 404; *Washington State University*

Dr. Heiko Jansen

- Reinforced classroom lectures by directing laboratory exercises involving central and peripheral nervous system dissections, discussions, quizzes, and exams focused on the fundamental principles of the organization and circuitry of the nervous system.

Senior Resident Advisor and Counselor

Summer 2006 – 2008

Summer Advantage; *Washington State University*

Kimberly Mueller

- Facilitated student relationships and support networks by living with, mentoring, tutoring, and counseling 30-65 co-ed students 24/7, while managing two other resident advisors. Expanded the program by effectively leading, budgeting, planning, and marketing the program.

Mentored Students

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| Undergraduate; Nate Cupertino, Current – <i>UMass</i> Maternal circadian desynchronization alters neural function in offspring | 2022 – Present |
| Graduate Student; Carey Dougan, Current – <i>UMass</i> Impact of needle-induced cavitation on glial and neural function | 2022 – Present |
| Undergraduate; Walker Sorensen, Current – <i>UMass</i> Python for automation of data management and analysis | 2022 |
| High School Student; Eric Kim, Current – <i>John Hopkins University</i> FGF-1 indirectly activates proopiomelanocortin neurons <i>*Selected for National Regeneron Science Talent Search competition which awarded a \$2,000 scholarship and \$2,000 funding for Sunset High School science club</i> | 2019 – 2020 |
| Undergraduate; Camdin Bennett, Current – <i>Western University Northwest Medical school</i> Synaptic development of proopiomelanocortin neurons | 2015 – 2017 |
| Undergraduate; Luke Duville, Current – <i>WiSA Tech.</i> Tanyocyte organization and development of leptin signaling | 2015 |

Outreach & Service

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| • Int. Society of Developmental Psychobiology; Student poster judge | 2022 |
| • Neuroscience & Behavior (NSB) Retreat Organizational Committee | 2022 |
| • Reviewer; <i>Frontiers in Endocrinology</i> | 2021 – Present |
| • NSB Graduate Student Mentorship Program | 2021 – Present |
| • NSB Educational Outreach Organization | 2020 – Present |
| • NSB DEI anti-racism action team: External Scientific Outreach | 2020 – 2021 |
| • Guest lecturer; Century High School AP Anatomy & Physiology | 2016 – 2020 |
| • Primary Panelist; ONPRC Scientific Public Outreach panel | 2015 – 2020 |
| • Intel International Science and Engineering Fair; Student Presentation Referee | 2019 |
| • Neuroanatomy Dissection Coordinator; Sunset High School science club | 2017-2019 |
| • Novo Nordisk Drug Discovery Partnership | 2015 – 2019 |
| • Presenter; ONPRC Camp Monkey, elementary school outreach | 2016 – 2019 |
| • Ambassador; New ONPRC postdoctoral fellows onboarding | 2016 – 2018 |
| • Faculty Search Committee; Washington State University | 2014 |
| • Facilitator and Project Coordinator; Kid's Judge Neuroscience outreach | 2009 – 2014 |
| • Ambassador; WSU Neuroscience Program | 2008 – 2009 |
| • President; Neuroscience Undergraduates Teaching Students Mentor program | 2008 – 2009 |
| • President; Unite for Sight | 2005 – 2006 |

Professional Memberships

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| International Society for Developmental Psychobiology | 2022 – Present |
| Sleep Research Society | 2021 – Present |
| Society for Research on Biological Rhythms | 2020 – Present |
| The Obesity Society | 2017 – 2020 |
| Society for the Study of Ingestive Behavior | 2014 – Present |
| Society for Neuroscience | 2010 – Present |