

Shaina M. Short, PhD

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EXPERIENCE

Postdoctoral Fellow

Nov 2015 – present

Department of Neurobiology and Anatomy at University of Utah, Salt Lake City, UT

- Investigating mechanisms of lateral inhibition involved in odor processing
- Utilizing cutting-edge in vivo two-photon imaging, calcium indicators, dopamine, GABA, and glutamate sensors, optogenetics, and chemogenetics to study microcircuit function
- Laboratory of Dr. Matt Wachowiak

Trainee

Aug 2018

Imaging Structure & Function in the Nervous System Course, Cold Spring Harbor Laboratory, NY

- Intensive laboratory and lecture course that provided training to utilize fundamental and emerging imaging technologies
- Collected the first 3D videos of odor-evoked activity in the olfactory bulb of awake mice using SCAPE (Swept, Confocally-Aligned Planar Excitation microscopy).
- Instructors: Drs. Michael Orger, Lucy Palmer, Florin Albeanu, and Philbert Tsai

Collaborating Lab Associate

Nov 2015 – Nov 2016

Department of Neuroscience at the Yale School of Medicine, New Haven, CT

- Continued computational modeling of lateral inhibition in the olfactory bulb
- Collaborations with Drs. Gordon M Shepherd, Thomas M Morse, and Justus V Verhagen

Postdoctoral Associate (Joint Appointment)

Jun 2013 – Oct 2015

The John B. Pierce Laboratory, New Haven, CT

- Investigated interactions between respiratory cycle phase-locked activity and olfactory sensory neuron input
- Mapped receptive fields of mitral and tufted cells in vivo
- Integrated optogenetics with a custom built and programmed digital micromirror device and in vivo electrophysiology
- Laboratory of Dr. Justus V Verhagen

Department of Neuroscience at the Yale School of Medicine, New Haven, CT

- Investigated the effects of respiration rates and the strength of lateral inhibition on mitral and tufted cells temporal dynamics with NEURON computational circuit modeling
- Developed a critical interface between physiological data collection and neural circuit modeling
- Utilized Python and Matlab to create novel optogenetic stimulation and data acquisition software
- Laboratory of Dr. Gordon M Shepherd

Graduate Research Assistant

Jul 2009 – May 2013

Department of Neuroscience at the UCONN Health Center, Farmington, CT

- Studied neuromodulation and synaptic plasticity of prefrontal cortical layer 5 pyramidal neuron apical tuft dendrites
- Designed and implemented a combination of whole cell patch clamp recordings and optical imaging of intracellular calcium and voltage dyes in acute brain slices and neural stem cell cultures
- Laboratory of Dr. Srdjan D Antic

Undergraduate Researcher for the National Science Foundation (REU-NSF)

Jun 2008 – May 2009

Department of Psychology, Weber State University, Ogden, UT

- Characterized the effects of melatonin supplementation on central executive function and physiological stress in law enforcement workers using various physiological cortisol assays and computerized cognitive tests
- Laboratories of Drs. Joan S Thompson and Rodney A Hansen

AWARDS

University of Utah Nominee for Warren Alpert Distinguished Scholars Fellowship Award

Submitted on Nov 1, 2020

- Competitive process in which I am the sole nominee from the University of Utah
- The awardee will receive \$400,000 over two years to facilitate transition into a faculty position

R21 NIDCD Early Career Research (ECR) Award

June 2020 – June 2023

- Principal investigator of research program studying dopaminergic mechanisms of odor information processing and experience-dependent plasticity in the olfactory bulb
- \$300,000 of unrestricted, transferable funds to establish an independent research laboratory

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AWARDS continued

NRSA F32 Postdoctoral Training Grant Award funded by NIDCD, NIH

July 2017 – July 2019

- Investigated mechanisms of gain control and concentration dependent processing in the olfactory bulb (publications currently in progress)
- Experiments utilize two photon, two color *in vivo* imaging, light-gated ion channels, designer receptors exclusively activated by designer drugs (DREADDs)

Polak Young Investigator Award

April 2019

- The Association of Chemoreception Science Committee recognizes the top 5-6 young investigators within 10 years of the doctoral degree based upon their scientific merit
- Received stipend to attend the annual Association of Chemoreception Science Conference to present my work as a talk during the Polak Young Investigator Award ceremony

Society for Neuroscience (SfN) Trainee Professional Development Award

Nov 2017

- Competitively selected as one of the top 150 undergraduates, graduate students, or postdoctoral fellows internationally to demonstrate scientific merit and excellence in neuroscience research
- This award aims to promote the advancement of neuroscience career training with a SfN conference stipend and unique networking opportunities

Polak Postdoctoral Travel Award

April 2016

- Competitively selected by the Association of Chemoreception Science Committee for travel funds to attend the annual conference

Yale Neuroscience Training Grant (T32 NIH NINDS)

Jul 2013 – Jul 2014

- Competitively selected by the department of Neuroscience at the Yale School of Medicine for an award covering salary for my initial year of postdoctoral training

Undergraduate Research for the National Science Foundation (REU-NSF)

Jun 2008 – Aug 2008

- Competitively selected for a research award covered by the National Science Foundation and Department of Defense to complete a research project
- A travel award was also included to attend the National Conference on Undergraduate Research

EDUCATION

Postdoctoral Training, Neurobiology

Nov 2015 – present

University of Utah – Department of Neurobiology and Anatomy, Salt Lake City, UT

Imaging Structure & Function in the Nervous System

July 24 – August 13, 2018

Cold Spring Harbor Laboratory – Cold Spring Harbor, NY

Postdoctoral Training, Neuroscience

Jun 2013 – Oct 2015

Yale University – Department of Neuroscience, New Haven, CT

John B. Pierce Laboratory – Department of Neuroscience, New Haven, CT

PhD, Biomedical Science

Jul 2009 – May 2013

UConn Health Center – Department of Neuroscience, Farmington, CT

BA, Biology, Psychology and Neuroscience

Sep 2005 – May 2009

St. Olaf College – Northfield, MN

LEADERSHIP

Review Topic Editor

Oct 2019 – present

Frontiers in Cellular Neuroscience

- Serve as a Guest Associate Editor, inviting reviewers, and overseeing the review of manuscripts submitted to a specific research topic
- Designing and hosting an article collection based on hot topics presented at the International Symposium on Olfaction and Taste 2020
- Write an editorial to bring the collection together

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LEADERSHIP continued

Review Editor

Oct 2019 – present

Frontiers in Integrative Neuroscience

- Review and process submitted manuscripts
- Assist in developing the strategic direction of the journal

Member, The Networking and Mentoring Committee

Jul 2019 – present

Association for Chemoreception Sciences

- During this 3-year appointment, I promote opportunities for junior postdoctoral fellows and graduate and undergraduate students to receive mentorship and career opportunities from senior members
- I advocate for promoting diversity and gender equality among members of the greater Association for Chemoreception Sciences community
- I organize career network events at annual meetings for the Association for Chemoreception Sciences and the International Symposium on Olfaction and Taste

Cofounder, Utah Women in Neuroscience (UWIN)

Sept 2020 – present

University of Utah and Intermountain Chapter of Society for Neuroscience

- Established a professional network that supports women in neuroscience careers
- Organizer of monthly networking and career development events
- Organizer of neuroscience outreach events
- Lead organizer of events specifically targeted to support mothers in neuroscience

Trainee, Miniscope Workshop

May 2018

Miniscope team, Instructors: Drs. Denise J. Cai and Daniel Aharoni

- Constructed my own Miniscope
- Learned how to record and analyze imaging data collected with the Miniscope

Organizer, Two-Photon Imaging Interest Group

Jul 2017 – Jul 2018

Department of Neurobiology and Anatomy – University of Utah, Salt Lake, UT

- I organize a monthly meeting where students can present their work and facilitate active discussions about how to improve imaging techniques and analyses
- I organize guest speaker presentations both within and outside the University of Utah to present their work utilizing the latest imaging technologies

President, Yale Neuroscience Postdoctoral Network

Jul 2013 – Jun 2014

Department of Neuroscience – Yale School of Medicine, New Haven, CT

- Advised postdoctoral fellows on their research and how to effectively present it to the Yale research community
- Planned and hosted a monthly presentation series to the entire Interdepartmental Neuroscience Program

Women in Science and Engineering Software Carpentry Boot Camp

Jun 2013

Microsoft Headquarters – Boston, MA

- Intense training in Python programming to acquire the skills necessary to begin my postdoctoral research at Yale University
- Attended seminars and question-answer sessions held by highly successful female programmers both in the private sector (predominantly J. P. Morgan) and academia

Instructor, Introduction to NEURON Modeling Class

Nov 2012

UCONN School of Medicine – Farmington, CT

- Educated medical students on modeling neuronal activity and basic neuron physiology

Student Representative, Neuroscience Department

Jun 2008 – Jun 2009

Graduate Student Organization – UCONN Health Center, Farmington, CT

- Planned and orchestrated outside speaker presentations, seminars, and social events for the graduate student community
- Assisted admissions office with attracting high quality students and planning recruitment events

PUBLICATIONS

Short SM*, Wachowiak M. Temporal dynamics of inhalation-linked activity across defined subpopulations of mouse olfactory bulb neurons imaged in vivo. eNeuro. 2019 June 17; ENEURO.0189-19.2019. ***corresponding author**

Short SM, Oikonomou KD, Zhou WL, Acker CD, Popovic MA, Zecevic D and Antic SD. The stochastic nature of action potential backpropagation in apical tuft dendrites. Journal of Neurophysiology. 2017 May 31;jn.00800.2016. doi: 10.1152/jn.00800.2016.

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PUBLICATIONS continued

Short SM*, Morse TM, McTavish TS, Shepherd GM, Verhagen JV. Respiration gates sensory input responses in the mitral cell layer of the olfactory bulb. PLoS One. 2016 Dec 22;11(12):e0168356. doi: 10.1371/journal.pone.0168356. ***corresponding author**

Oikonomou KD*, **Short SM***, Rich MT, Antic SD. Extrasynaptic glutamate receptor activation as cellular bases for dynamic range compression in pyramidal neurons. Front Physiol. 2012 Aug 24;3:334. PMID: 22934081; PMCID: PMC3429100

***Authors contributed equally**

Zhou WL, **Short SM**, Rich MT, Oikonomou KD, Singh MB, Sterjanaj EV, Antic SD. Branch specific and spike-order specific action potential invasion in basal, oblique and apical dendrites of cortical pyramidal neurons. *Neurophotonics*. 2014 2(2), 021006 (Dec 29, 2014). doi:10.1117/1.NPh.2.2.021006

- I designed experiments, collected and analyzed a substantial amount of imaging and electrophysiology data, generated figures, edited the manuscript, and presented data.

Gautam SH, **Short SM**, Verhagen JV. Retronasal odor concentration coding in glomeruli of the rat olfactory bulb. Front Integr Neurosci. 2014 Oct 24;8:81. doi: 10.3389/fnint.2014.00081. PMID: 25386123

-I analyzed all the data, generated figures, and wrote the manuscript.

Rebello MR, McTavish TS, Willhite DC, **Short SM**, Shepherd GM, Verhagen JV. Perception of odors linked to precise timing in the olfactory system. PLOS Biology. 2014 Dec 16;12(12):e1002021. doi: 10.1371/journal.pbio.1002021. PMID: 25514030

-I collected and analyzed all electrophysiology data, generated figures, edited the manuscript, and presented the data.

Oikonomou KD, Rich MT, **Short SM**, Singh MB Contribution of extrasynaptic N-methyl-D-aspartate and adenosine A1 receptors in the generation of dendritic glutamate-mediated plateau potentials. Philos Trans R Soc Lond B Biol Sci. 2015 Jul 5;370(1672). pii: 20140193. doi: 10.1098/rstb.2014.0193

-I collected and analyzed data and edited the manuscript.

Belinsky GS, Rich MT, Sirois CL, **Short SM**, Pedrosa E, Lachman HM, Antic SD. Patch-clamp recordings and calcium imaging followed by single-cell PCR reveal the developmental profile of 13 genes in iPSC-derived human neurons. Stem Cell Res. 2014 Jan;12(1):101-18. doi: 10.1016/j.scr.2013.09.014.

-I collected and analyzed electrophysiology data, generated figures, and edited the manuscript.

Belinsky GS, Sirois CL, Rich MT, **Short SM**, Moore AR, Gilbert SE, Antic SD. Dopamine receptors in human embryonic stem cell neurodifferentiation. Stem Cells Dev. 2013 May 15;22(10):1522-40. PMID: 23286225; PMCID: PMC3653401

-I collected and analyzed electrophysiology data, generated figures, and edited the manuscript

Zhou WL, Oikonomou KD, **Short SM**, Antic SD. Dopaminergic regulation of dendritic calcium: fast multisite calcium imaging. Methods Mol Biol. 2013;964:123-38. PMID: 23296782

-I collected and analyzed electrophysiology and imaging data, generated figures, and edited the manuscript.

Belinsky GS, Moore AR, **Short SM**, Rich MT, Antic SD. Physiological properties of neurons derived from human embryonic stem cells using a dibutyl cyclic AMP-based protocol. Stem Cells Dev. 2011 Oct;20(10):1733-46. PMID: 21226567

-I collected and analyzed electrophysiology data, generated figures, and edited the manuscript.

Antic SD, Zhou WL, Moore AR, **Short SM**, Oikonomou KD. The decade of the dendritic NMDA spike. J Neurosci Res. 2010 Nov 1;88(14):2991-3001. Review. PMID: 20544831

-I contributed data, reviewed, edited, and discussed the manuscript.

PRESENTATIONS, ABSTRACTS, AND PROCEEDINGS PUBLICATIONS

***presenting author**

SM Short*, M Wachowiak. 2020. How does odorant intensity modulate inhalation-linked temporal dynamics in the olfactory bulb? Invited talk for the Respiratory Modulation of Brain Activity and Behavior symposium at the International Symposium on Olfaction and Taste (ISOT). **Please contact me (shainashort@gmail.com or 764-245-6779) if interested in watching a recording of this live presentation.** (One first author manuscript published and another in preparation)

SM Short*, M Wachowiak. 2019. Comparison of odorant intensity-response functions of olfactory bulb inputs, outputs, and interneurons using in vivo two-photon imaging. **Polak Young Investigator Awardee** talk at the Association for Chemoreception Sciences Conference (One first author manuscript published and another couple first authors in preparation)

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PRESENTATIONS, ABSTRACTS, AND PROCEEDINGS PUBLICATIONS continued

***presenting author**

SM Short*, M Wachowiak. 2017. Feedforward inhibition shapes in vivo dynamics of inhalation-linked odor responses in subpopulations of olfactory bulb neurons. Abstract for poster and **Society for Neuroscience (SfN) Trainee Professional Development Awardee** at the 2017 SfN Conference (first author manuscript published)

SM Short*, M Wachowiak. 2017. Within a Sniff: Comparing Inhalation-linked Temporal Dynamics of Olfactory Bulb Inhibitory Interneuron and Excitatory Output Neuron Subpopulations. Abstract for a poster presentation at the Association for Chemoreception Sciences Conference. Also, **2nd Place Poster Winner** at the Intermountain SfN Chapter conference (first author manuscript published).

SM Short*, TS McTavish, TM Morse, GM Shepherd, JV Verhagen. 2016. Respiration Gates Sensory Input Responses in the Mitral Cell Layer of the Olfactory Bulb. Abstract for a poster presentation as a **Polak Travel Awardee** at the Association for Chemoreception Sciences Conference (first author manuscript published).

SM Short*, TS McTavish, TM Morse, GM Shepherd, JV Verhagen. 2015. Circuit models identify mechanisms of respiration driven lateral inhibition underlying mitral cell activity. Competitively selected for and presented a **Nanosymposium talk** at the SfN Conference (first author manuscript published)

SM Short*, TS McTavish, TM Morse, GM Shepherd, JV Verhagen. 2015. The spatiotemporal input-output function of the olfactory bulb is modulated by respiratory cycle activity. Abstract for a poster presentation at the Association for Chemoreception Sciences Conference and the Yale School of Medicine Neuro Day (first author manuscript published)

SM Short*, TS McTavish, TM Morse, GM Shepherd, JV Verhagen. 2014. The spatiotemporal input-output function of the olfactory bulb is modulated by respiratory cycle activity. Competitively selected for and presented a **Dynamic poster** at the SfN Conference, (first author manuscript published)

SM Short*, TS McTavish, TM Morse, GM Shepherd, JV Verhagen. 2014. The effect of glomerular input patterns on mitral cell responses in the olfactory bulb. Abstract for a poster presentation at the Association for Chemoreception Sciences, Bonita, FL and the Yale School of Medicine Neuro Day (first author manuscript published)

MR Rebello, TS McTavish, DC Willhite, **SM Short***, GM Shepherd, JV Verhagen. 2014. Mice can use temporal information encoded in the mitral cell network of the olfactory bulb for odor perception. Abstract for a poster presentation at the Yale Neuroscience Recruitment Week Conference (manuscript published)

SM Short*, KD Oikonomou, MT Rich, SD Antic. 2012. Modulation of dendritic excitability in the apical tuft dendrites of the rat prefrontal cortex studied with 120-minute calcium dye loading protocols. 2012. Abstract for a poster presentation at the Society for Neuroscience conference, New Orleans, LA; the UCONN Health Center Dept. of Neuroscience retreat, Hartford, CT; and the Neuroscience at Storrs retreat, University of Connecticut, Storrs, CT (first author manuscript published)

KD Oikonomou*, **SM Short**, MT Rich, SD Antic. 2012. Comparison of Dendritic NMDA Spikes and Dendritic Plateau Potentials. Abstract for a poster presentation at the Society for Neuroscience conference, New Orleans, LA; and the UCONN Health Center Dept. of Neuroscience retreat, Hartford, CT (first author manuscript published)

SM Short*, KD Oikonomou, MT Rich, SD Antic. 2011. Dopaminergic and Cholinergic Neuromodulation of Apical Tuft Dendritic Excitability in Layer V Pyramidal Neurons of the Rat Prefrontal Cortex. Abstract for a poster presentation at UCONN Health Center Dept. of Neuroscience retreat, Farmington, CT; the 2011 Neuroscience at Storrs retreat, University of Connecticut, Storrs, CT and a seminar at the UCONN Health Center Dept. of Neuroscience, Farmington, CT (first author manuscript published)

SM Short*, SJ Walsh*, Rod Hansen, and Joan Thompson. 2009. The effects of melatonin supplementation on central executive function and physiological stress in law enforcement workers. National Conference on Undergraduate Research. (manuscript published in conference proceedings)