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Engineering & Scientific Consulting

Tabitha Shen, Ph.D.

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Professional Profile

Dr. Shen's background in biomedical engineering has focused on collecting, improving, interpreting and processing electrical physiological signals. Dr. Shen's laboratory work has spanned multiple in vivo animal (including human) models, where she performed surface and conventional electromyography (EMG), extracellular neural and nerve recording, pharmaceutical testing and medical device testing. As a consultant, she has experience in helping clients design and execute large-scale human subject data collection studies that will aid in the development of new wearable devices for health and fitness tracking. She also has training in Good Clinical Practice (GCP) and Institutional Review Board (IRB) requirements.

Prior to working at Exponent, Dr. Shen worked as a Post-Doctoral Associate at the University of Florida where her research focused on understanding how neural circuitry from the brain controls upper airway reflexes and the understanding the relationship between upper airway reflexes, breathing and the cardiovascular system. This work involved in vivo models, digital signal processing, histology and pharmaceutical testing. Previously, she received her Ph.D. from Stony Brook University, where her thesis work used neurogram recordings from in vivo and in situ models to understand short- and long-timescale reorganization of the neural network controlling breathing.

Academic Credentials & Professional Honors

Ph.D., Biomedical Engineering, SUNY, Stony Brook University, 2014

M.S., Biomedical Engineering, SUNY, Stony Brook University, 2006

B.S., Biomedical Engineering, Washington University in St. Louis, 2004

Respiration Section Trainee Poster Presentation Awards winner, Experimental Biology, 2021

Presidential Award, The 11th Oxford Conference on Modeling and Control of Breathing, 2009

Licenses and Certifications

Good Clinical Practices (GCP) in Medical Device Clinical Investigations (CA)

Prior Experience

Post Doctoral Associate, University of Florida, 2015-2022

Graduate Research Assistant, Stony Brook University, 2006-2014

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Research Technician, Washington University School of Medicine, 2001-2003

Summer Intern, Recombinant Capital, 2002

Professional Affiliations

American Physiological Society (APS)

Publications

Musselwhite MN, Shen TY, Rose MJ, Iceman KE, Poliacek I, Pitts T, Bolser DC. The influence of CO2 on spatiotemporal features of mechanically induced cough in anesthetized cats. Respiratory Physiology & Neurobiology. 2023 Jan 1;307:103964.

Shen TY, Poliacek I, Rose MJ, Musselwhite MN, Kotmanova Z, Martvon L, Pitts T, Davenport PW, and Bolser DC. The role of neuronal excitation and inhibition in the pre-Bötzinger complex on the cough reflex in the cat. Journal of Neurophysiology (2022): 267-278. doi: 10.1152/jn.00108.2021

Shen TY, Pertzborn MC, Rose MJ, Musselwhite MN, Davenport PW, and Bolser, DC. Influence of intrathoracic vagotomy on the cough reflex in the anesthetized cat. Respiratory Physiology & Neurobiology (2022): 103805. doi: 10.1016/j.resp.2021.103805

Musselwhite MN, Shen TY, Rose MJ, Iceman KE, Poliacek I, Pitts T and Bolser DC. Differential effects of acute cerebellectomy on cough in spontaneously breathing cats. Plos one 16.6 (2021): e0253060. doi: 10.1371/journal.pone.0253060

King SN, Shen TY, Musselwhite MN, Huff A, Reed MD, Poliacek I, Howland DR, Dixon W, Morris KF, Bolser, DC and Iceman, KE. "Swallow Motor Pattern Is Modulated by Fixed or Stochastic Alterations in Afferent Feedback." Frontiers in human neuroscience 14 (2020): 112. doi: 10.3389/fnhum.2020.00112

Kotmanova Z, Simera M, Veternik M, Martvon L, Misek J, Jakus J, Shen TY, Musselwhite MN, Pitts T, Bolser DC, Poliacek I. "GABA-ergic neurotransmission in the nucleus of the solitary tract modulates cough in the cat." Respiratory physiology & neurobiology 257 (2018): 100-106. doi: 10.1016/j.resp.2018.02.009

Pitts T, Gayagoy AG, Rose MJ, Poliacek I, Condrey JA, Musselwhite MN, Shen TY, Davenport PW, Bolser DC. "Suppression of Abdominal Motor Activity during Swallowing in Cats and Humans (vol 10, e0128245, 2015)." PLOS ONE 13.5 (20185: e0197525. doi: 10.1371/journal.pone.0128245

Shen TY, Ono K, Solomon IC. Influence of extracellular [K+]o on inspiratory network complexity of phrenic and hypoglossal nerve discharge in arterially-perfused adult rat. Adv Exp Med Biol. 2010;669:181-4. doi: 10.1007/978-1-4419-5692-7_36

Ono K, Shen TY, Chun HH, Solomon IC. Upper airway and abdominal motor output during sneezing: is the in vivo decererate rat an adequate model? Adv Exp Med Biol. 2010;669:173-6. doi: 10.1007/978-1-4419-5692-7_34

Ames CD, Venkatesh R, Weld KJ, Morrissey K, Foyil KV, Shen TY, Dryer S, Hruby G, Sutera SP, Landman J. "Laparoscopic renal parenchymal hypothermia with novel ice-slush deployment mechanism." The Journal of Urology 175.3 (2006): 895-896. doi: 10.1016/S0022-5347(05)00560-4

Ames CD, Venkatesh R, Weld KJ, Morrissey K, Foyil KV, Shen T, Dryer S, Hruby G, Sutera SP and Landman J. Laparoscopic renal parenchymal hypothermia with a novel ice-slush deployment mechanism. Urology 2005 Jul;66(1):33-7. doi: 10.1016/j.urology.2005.02.012

Oral Presentations

Central mechanisms of the laryngeal adductor reflex. University of Florida Physiological Sciences Seminar Series. October 1, 2019.

Laryngeal adductor reflex: circuitry insights provided by network scale analysis. University of Florida Physiological Sciences Seminar Series. October 24, 2017.

Investigating the role of the dorsal medulla in airway protection. University of Florida. Invited speaker. June 22, 2015.

Effects of extrinsic perturbations on the relationship among respiratory related discharges. University of Florida. Invited speaker. November 18, 2013.

Interaction between central respiratory neural control and spontaneous bladder contractions. Johns Hopkins University. Invited Speaker. July 10, 2013.

Respiratory neural discharges during spontaneous bladder contractions in decerebrate versus urethane-anesthetized adult in vivo rat. XIIth Oxford Conference: Breathing, Emotion and Evolution 2012. Invited Speaker.

Poster Presentations

Shen TY, Olsen WL, Rose MJ, Wang W, Bolser DC. Breathing rhythm stability is higher after intravenous injection of codeine relative to fentanyl in cats. Experimental Biology 2022. Philadelphia, PA.

Bolser DC, Shen TY, Olsen WL, Nuding S, Segers LS, Rose MJ, Valerizo P, Wang W, Morris KF. Effects of Intra-arterial fentanyl and codeine on medullary respiratory network organization. Experimental Biology 2022. Philadelphia, PA.

Shen TY, Rose MJ, Musselwhite MN, Wang W, Bolser DC. Stimulation of upper airway afferents with capsaicin and section of the superior laryngeal nerve modulate mechanically induced coughing from the tracheobronchial airways in male but not female cats. The FASEB Journal 35.S1 (2021).

Musselwhite MN, Shen TY, Rose MJ, Poliacek I, Iceman KE, Bolser DC and Pitts T. Mapping of the Substrate for Production of Swallow and Cough Within the Rostral Nucleus of the Tractus Solitarius (NTS)/Paramedian Reticular Nucleus by Electrical Stimulation. The FASEB Journal, 35.

Shen TY, Rose MJ, Olsen WL, Wang W, McLeod JC, Segers LS, Nuding SC, Pitts TG, Poliacek I, Gestreau C, Morris KF. Laryngeal Adductor Reflex Motor Bursts Rapidly Oscillate in the Cat. The FASEB Journal 34.S1 (2020).

Musselwhite MN, Shen TY, Rose MJ, Olsen WL, Pitts TG, Bolser DC. Codeine Asymmetrically Inhibits The Laryngeal Adductor Reflex. The FASEB Journal 34.S1 (2020).

Rose MJ, Shen TY, Musselwhite MN, Davenport PW, Bolser DC. Role of vagal pathways in the respiratory depressant effect of codeine on breathing in the anesthetized cat. The FASEB Journal 33.S1 (2019): 547-12

Bolser DC, Shen TY, Musselwhite MN, Rose MJ, Davenport PW, Morris KM, & Pitts T. Influence of codeine on swallow in the anesthetized cat: evidence for peripheral and central actions of opioids to induce dysregulation of deglutition. The FASEB Journal 33.S1 (2019): 547-13.

Shen TY, Poliacek I, Martvon L, Musselwhite MN, Rose MJ, Morris KM, Bolser DC. Microinjection of Gabazine and Kynurenic Acid into the PreBotzinger Complex Alter Cough Phase Durations in the Cat. The FASEB Journal 33.S1 (2019): 547-15.

Musselwhite MN, Shen TY, Rose MJ, Reed MD, Poliacek I, Pitts T, Bolser DC. The Role of the Cerebellum on the Control of Tracheobronchial Cough in Spontaneously Breathing Cats. The FASEB Journal 33.S1 (2019): 547-14.

Fullerton AL, Shen TY, Musselwhite MN, Rose MJ, Davenport PW, Morris KF, Bolser DC. Multiple abdominal burst patterns observed during tracheobronchial coughing in anesthetized cats. The FASEB Journal 32 (2018): 913-15.

Shen TY, Poliacek I, Kotmanova Z, Musselwhite MN, Rose MJ, Bolser DC. Evidence that the preBotzinger complex does not participate in cough rhythmogenesis in the anesthetized cat. The FASEB Journal 32 (2018): 913-14.

Musselwhite MN, Shen TY, Rose MJ, Watts J, Bolser DC. The influence of CO2 on spatiotemporal features of mechanically□induced coughing in anesthetized cats. The FASEB Journal 32 (2018): 913-16.

Additional Education & Training

Empowering Women in Technology Startups, University of Florida, 2016