

Zhe Zhao, Ph.D.

Postdoc, Sarah Stern Lab

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RESEARCH INTEREST

My research focuses on how the brain simultaneously computes multiple internal physiological needs to guide appropriate feeding and drinking behaviors. The insular cortex monitors internal body states in real time. However, its underlying molecular and circuit mechanisms remain poorly understood. To address this, I employ a novel two-alternative forced-choice (water or food) task combined with advanced mRNA profiling and in vivo calcium imaging to investigate the molecular and neural circuit mechanisms of hunger and thirst in the insular cortex. The overarching goal of my research is to identify molecular markers and neural algorithms underlying hunger and thirst states, as well as ingestive behaviors, thereby promoting the development of new therapeutic strategies for obesity, diabetes, and eating disorders.

EDUCATION

Oct. 2015 - Mar. 2020 **Ph.D. in Neuroscience**, University of Bordeaux, France

Sep. 2007 - Jun. 2011 **B.A. in Biological Engineering**, Hebei Agricultural University, China

RESEARCH EXPERIENCE

Jan. 2021 - Present **Postdoc** at Max Planck Florida Institute for Neuroscience, Jupiter, FL

Advisor: Sarah Stern, Group Leader

Project: Control of feeding behavior by a body fat-insula axis

Apr. 2020 - Dec. 2020 **Postdoc** at Neurocentre Magendie, Inserm 1215, University of Bordeaux, France

Advisor: Anna Beyeler, Group Leader

Project: Cannabinoid control of water intake in insular circuits

Oct. 2015 - Mar. 2020 **Graduate Student** at Neurocentre Magendie, Inserm 1215, University of Bordeaux, France

Advisor: Giovanni Marsicano, Group Leader

Project: Control of water intake by the endocannabinoid system

Dec. 2011 - Oct. 2015 **Technician** in Imaging Facility at National Institute of Biological Sciences, Beijing, China.

Advisor: Chen Zhan, Associate Investigator

Project: Control of blood glucose levels by hindbrain NE/E neurons

PUBLICATIONS

Preprints

- **Zhao Z.**, Xu B., Anthony S., Subramanian S., Granger B., Von-Walter C., Mizrachi E., Kidd M., Srigiriraju A., McKie I., Li Z., Bolton M. M., Berto S., & Stern S. A. (2025). Direct interoceptive input to the insular cortex shapes learned feeding behavior. **bioRxiv** (in revision at Cell).
- Litvak E., **Zhao Z.**, Perets I., Lavi A., Izhaki O., Barkan-Michaeli R., Levin U., Stern A.S., Sharabi, K., Livneh Y. (2025). Insular cortex predictions regulate glucose homeostasis. **bioRxiv** (in revision at Nature Neuroscience).
- **Zhao Z.***, Xu B.*, Loomis L. C., Anthony A. S., McKie I., Srigiriraju A., Bolton M., Stern A. S. (2024). INGEsT: an open-source behavioral setup for studying self-motivated ingestive behavior and learned operant behavior. **bioRxiv** (in submission).

Selected publications

- **Zhao Z.**, Covelo A., Couderc Y., Mitra A., Varilh M., Wu Y., Jacky D., Fayad R., Cannich A., Bellocchio L., Marsicano G. Beyeler A. Cannabinoids regulate an insular circuit controlling water intake. **Current Biology**, 2024 (IF: 8.1).
- **Zhao Z.**, Soria-Gómez E., Varilh M., Julio-Kalajzic F., Cannich A., Castiglione A., Vanhoutte L., Duveau A., Zizzari F., Beyeler A., Cota D., Bellocchio L., Busquets-Garcia A., Marsicano G. A novel mechanism for top-down control of water intake. **Current Biology**, 2020 (IF: 10.834).
- **Zhao Z.***, Wang L.*, Gao W.*, Hu F., Zhang J., Ren Y., Lin R., Feng Q., Cheng M., Ju D., Chi Q., Wang D., Song S., Luo M., Zhan C. A central catecholaminergic circuit controls blood glucose levels during stress. **Neuron**, Volume 95, Issue 1, p138–152.e5, 5 July 2017 (IF: 14.318, Featured article).
- **Zhao Z.**, Stern A. S. Homeostatic feeding in hedonic centres. **Nat Metab.** 2024 Aug; 6(8):1433-1434. doi: 10.1038/s42255-024-01089-6. PMID: 39147932 (News and Views).

Additional publications

- Soria-Gómez E., Zottola P.C.A., Mariani, Y., Desprez, T.,...Varilh M., Cannich A., Redon B., **Zhao Z.**,...Marsicano G., Bellocchio L., Subcellular specificity of cannabinoid effects in striatonigral circuits. **Neuron**, 2020 (IF: 17.173).
- Oliveira da Cruz J. F., Busquets-Garcia A., **Zhao Z.**, Varilh M., Bellocchio L., Robin L., Marsicano G., Soria-Gómez E. Specific hippocampal interneurons shape consolidation of recognition memory. **Cell Reports**, 2020 (IF: 9.423).
- Martin-Fernandez M., Jamison S., Robin L., **Zhao Z.**, Martin D., Aguilar J., Benneyworth M., Marsicano G., Araque A. Synapse-specific astrocyte gating of amygdala-related behavior. **Nature Neuroscience**, 2017 (IF:17.839).
- Wang D., He X., **Zhao Z.**, Feng Q., Lin R., Sun Y., Ding T., Xu F., Luo M., Zhan C. Whole-brain mapping of the direct inputs and axonal projections of POMC and AgRP neurons. **Frontiers in Neuroanatomy** 9:40, 2015 (IF: 3.26).

PRESENTATIONS & POSTERS

Oral Presentations

- 2026 Sunposium Conference, West Palm Beach, FL, US
- 2025 Annual Conference, Florida Consortium on the Neurobiology of Cognition, US
- 2025 Research Fest of the Herbert Wertheim UF Scripps Institute for Biomedical Innovation & Technology, US
- 2024 Tri Institutional Seminar Series (MPFI, UF Scripps, FAU), US
- 2023 Annual Conference, Florida Consortium on the Neurobiology of Cognition, US
- 2019 Neurocentre Magendie Symposium, Boredeaux, France
- 2019 17th Synapse Day Meeting, Boredeaux, France
- 2018 Silk Road Young Scholars Seminar, Xi'an, China
- 2018 Cannabinoids, the relevance to central nervous system and pain, Modena, Italy

Posters

- 2025 Keystone Conference, Interoception, Seattle, WA, US
- 2024 88th CSHL Symposium: Brain Body Physiology, NY, US
- 2023 Sunposium Conference, West Palm Beach, FL, US
- 2023 SSIB (Society for Studying Ingestive Behavior) the 30th Annual Meeting, Oregon, US
- 2018 Society for Neuroscience 48th annual meeting, San Diego, CA, US
- 2017 Frontier in Neurophotonics, Bordeaux, France
- 2017 4th Bordeaux Neurocampus Conference, Bordeaux, France
- 2017 Super-resolution in Photonic Microscopy, Bordeaux, France
- 2017 NeuroFrance, Bordeaux, France
- 2016 3rd Bordeaux Neurocampus Conference, Bordeaux, France
- 2016 The Catania international school in neuroscience "Cannabinoid receptors: their role on physiology and pathology", Noto, Italy

HONORS & AWARDS

- 2025 Trainee Professional Development Award (TPDA), Society for Neuroscience, US
- 2025 Outstanding Postdoctoral Scholar Engagement Award, Annual Conference of Florida Consortium on the Neurobiology of Cognition, FL, US

HONORS & AWARDS

- 2025 3rd place oral presentation, Research Fest of the Herbert Wertheim UF Scripps Institute for Biomedical Innovation & Technology, FL, US
- 2023 Travel Award, Max Planck Florida Institute for Neuroscience Postdoctoral Travel Grant
- 2019 Travel Award, Sun Yat-sen University Young Scholars Seminar, Guangzhou, China
- 2018 Travel Award, Silk Road Young Scholars Seminar, Xi'an, China
- 2016 Travel Award, Catania International School in Neuroscience, Noto, Italy
- 2015 Graduate Scholarship, China Scholarship Council

COMMUNITY OUTREACH

- 2025 Scientific Presentation: Biological Engineering, Lighthouse Elementary School, Jupiter, Florida, US
- 2024 Volunteer, Brain Science Event, Garden's Mall, Palm Beach Garden, Florida, US
- 2023 Volunteer, Brain Exploration Day, Max Planck Florida Institute for Neuroscience

COMMITTEE SERVICE

- 2025 - present Chair of NeuroMEETs Selection Committee, Max Planck Florida Institute for Neuroscience, Jupiter, US
- 2024 - present Chair of Trainee Subcommittee, and executive committee member, Florida Consortium on the Neurobiology of Cognition, US
- 2023, 2026 Committee member, Sunposium Conference, West Palm Beach, Florida, US

PEER REVIEWER SERVICE

- 2024 - present Scientific Reports, Frontiers in Molecular Neuroscience, et al.

MENTORSHIP

- 2015 - present Trainee supervision for 3 PhD rotations, 3 master's students, 2 postbacs, 2 undergraduates, and 1 technician at Max Planck Florida Institute for Neuroscience, Jupiter, US and University of Bordeaux, France.

SKILLS

Neuroanatomy	Neural circuit mapping	Single neuron morphology	
Neural dynamics	<i>In/ex vivo</i> calcium imaging	<i>In/ex vivo</i> electrophysiology	
Neural perturbation	Chemogenetics	Optogenetics	Pharmacology
Behavioral essays	Feeding/drinking	Operant behavior	Anxiety
Data analytical skills	Matlab	Python	Graphpad
Electrical engineering	Arduino	Teensy	Bpod