Qingguang Zhang, Ph.D.

Assistant Professor (Start Jan. 1st, 2024)
Department of Physiology
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Education

2011-2015	Ph.D.	Biomedical Engineering | University of Kentucky, Lexington, KY
2008-2011	M.S.	Biomedical Engineering | Shandong University, China
2004-2008	B.E.	Biomedical Engineering | Shandong University, China

Positions

2024-present	**Assistant Professor**, Department of Physiology, Michigan State University
2020-2023	**Assistant Research Professor**, Engineering Science and Mechanics, Penn State
2015-2020	**Postdoctoral Fellow**, Engineering Science and Mechanics, Penn State
2011-2015	**Graduate Research Assistant**, Biomedical Engineering, University of Kentucky
2009-2011	**Software Development Engineer**, Jinan HYRG Technology Co. Ltd., China
2008-2011	**Graduate Research Assistant**, Biomedical Engineering, Shandong University, China

Funding

Current Funding

American Heart Association Career Development Award (Award# 935961) 2022-2025 Total: $230,337
Cellular Architecture and Functional Imaging: Integrated Approach for Understanding Cerebrovascular Aging in Awake Mice
Role: PI

Fellowships and Awards

2022-2025	Career Development Award, American Heart Association
2014-2015	International Student Scholarship, University of Kentucky
2013	Max Steckler Fellowship, University of Kentucky
2011	Third Place Award, LabVIEW Student Design Competition, National Instruments
2011	First Place Presentation Award at Qilu Graduate Student Academic Forum
2009-2011	Outstanding Graduate Student Scholarship, Shandong University
2005-2008	Outstanding Undergraduate Student Scholarship, Shandong University

Peer-Reviewed Publications Google Scholar, ORCID

19. Bennett HC*, **Zhang Q***, Wu YT, Chon U, Pi H, Drew PJ and Kim Y. Aging drives cerebrovascular network remodeling and functional changes in the mouse brain. ***Nature Communications***. *Under review*. [Full text available on *Biorxiv*, doi: 10.1101/2023.05.23.541998. (Link)] ***Co-first author**.

18. Gheres KW, Aoensal HS, Han X, **Zhang Q**, Turner KL, Zhang N, and Drew PJ. Arousal state transitions occlude sensory-evoked neurovascular coupling in neonatal mice. ***Communications Biology***. *2023,* doi: 10.1038/s42003-023-05121-5. (Link)

17. **Zhang Q**, Haselden WD, Charpak S and Drew PJ. Could respiration-driven blood oxygen changes modulate neural activity? ***Pflügers Archiv-European Journal of Physiology***. 2022, doi: 10.1007/s00424-022-02721-8. (Link)

16. Wu YT, Bennett HC, Chon U, Vanselow DJ, **Zhang Q**, Muñoz-Castañeda R, Cheng KC, Osten P, Drew PJ, Kim Y. Quantitative relationship between cerebrovascular network and neuronal cell types in mice. ***Cell Reports***. 2022, 39(12), doi: 10.1016/j.celrep.2022.110978. (Link)

    "Brain regions vulnerable to disease may lack adequate energy from blood supply" - Penn State News

15. **Zhang Q***, Turner KL, Gheres KW, Md SH and Drew PJ*. Behavioral and physiological monitoring for awake neurovascular coupling experiments: A how-to guide. ***Neurophotonics***. 2022, 9(2), 021905. doi: 10.1117/1.NPh.9.2.021905. (Link) ***Co-corresponding author**.

"Researchers publish how-to guide for monitoring and analyzing brain activity" - Penn State News

14. **Zhang Q***, Gheres KW, and Drew PJ*. Origins of 1/f-like cerebral tissue oxygenation fluctuations in the murine cortex. ***PLoS Biology***. 2021, doi: 10.1371/journal.pbio.3001298. (Link) ***Co-corresponding author**.

"Red blood cell 'traffic' contributes to changes in brain oxygenation" - Science Daily, Penn State News

13. **Zhang Q**, Roche M, Gheres KW, Chaigneau E, Kedarasetti RT, Haselden WD, Charpak S and Drew PJ. Cerebral oxygenation during locomotion is modulated by respiration. ***Nature Communications***. 2019, doi:10.1038/s41467-019-13523-5. (Link)

"Want to increase brain oxygenation? Locomotion may be key" - Psychology Today, Neuroscience News

12. Norwood JN, **Zhang Q**, Card D, Craine A, Ryan TM and Drew PJ. Anatomical basis and physiological role of cerebrospinal fluid transport through the murine cribriform plate. ***eLife***, 2019, 8. (Link)

"Sense of smell, pollution and neurological disease connection explored" - Medical Express

11. Drew PJ, Winder AT and **Zhang Q**. Twitches, blinks, and fidgets: important generators of ongoing neural activity. ***Neuroscientist***. 2019, 25(4): 298-313. (Link)

"The fidgeting brain" - Discover Magazine

10. Winder AT, Echagarruga C, **Zhang Q** and Drew PJ. Weak correlations between hemodynamic signals and ongoing neural activity during the resting state. ***Nature Neuroscience***, 2017, 20: 1761-1769. (Link)

9. Gao Y, Ma Y, **Zhang Q**, Winder AT, Liang Z, Antinori L, Drew PJ and Zhang N. Time to wake up: studying neurovascular coupling and brain-wide circuit function in the un-anesthetized animal. ***Neuroimage***, 2017, 153: 382-398. (Link)

8. **Zhang Q**, Evans JM, Stenger MB, Moore FB and Knapp CF. Autonomic cardiovascular responses to orthostatic stress after a short artificial gravity exposure. ***Aerospace Medicine and Human Performance***. 2017, 88: 827-833. (Link)

7. Evans JM, Wang S, Greb C, Kostas VI, Knapp CF, **Zhang Q**, Roemmele ES, Stenger MB and Randall DC. Body size predicts cardiac and vascular resistance effects on men's and women's blood pressure. ***Frontiers in Physiology***, 2017, 8: 561. (Link)

6. Evans JM, Knapp CF, Ribiero CL, Moore FB, Wang S, **Zhang Q**, Kostas VI, Ferguson CR, Falvo MJ, Stenger MB, Goswami N, Smith JD and Serrador JM. Hypovolemic men and women regulate blood pressure differently following exposure to artificial gravity. ***European Journal of Applied Physiology***, 2015, 115: 2631-2640. (Link)

5. **Zhang Q**, Patwardhan AR, Knapp CF and Evans JM. Cardiovascular and cardiorespiratory phase synchronization in normovolemic and hypovolemic humans. ***European Journal of Applied Physiology***, 2015, 115: 417-427. (Link)

4. Evans JM, Jenkins RA, Ilgner RH, Knapp CF, **Zhang Q** and Patwardhan AR. Acute cardiovascular autonomic responses to inhaled particulates. ***European Journal of Applied Physiology***, 2015, 115: 257-268. (Link)

3. **Zhang Q**, Knapp CF, Stenger MB, Patwardhan AR, Elayi SC, Wang S, Kostas VI and Evans JM. Simulations of gravitational stress on normovolemic and hypovolemic men and women. ***Aviation, Space and Environmental Medicine***, 2014, 85 (4): 407-413. (Link)

2. Li L, Yang J, Liu C, Liu C, **Zhang Q** and Li K. The effect of resampling on spectral analysis of pulse interval series. ***Journal of Shandong University (Engineering & Science)***, 2011, 41(2): 102-106. (In Chinese with English Abstract)

1. Liu C, Liu C, **Zhang Q** and Li Q. Construction method for normalized histogram of RR sequence and its application for evaluation heart failure. ***ACTA BIOPHYSICA SINICA***, 2009, 25(4): 299-304. (In Chinese with English Abstract)

Patents

1. Yang J, Li L, Liu C, Liu C, and **Zhang Q**. A noninvasive cardiovascular function evaluation device based on multi-modal physiological time series variability analysis. Patent Number: CN 201010267520. File Date: 08/31/2010. Issue Date: 12/29/2010. China. (In Chinese)

2. Liu C, Liu C, **Zhang Q**, Cao Y, Li B, Li L, and Yang J. A device for detecting heart failure based on normalized histogram of RR interval time series. Patent Number: CN 200810238523. File Date: 12/18/2008. Issue Date: 05/27/2009. China. (In Chinese)

Conference Proceedings

1. **Zhang Q** and Liu C. Pulse rate variability analysis based on sample entropy. The Qilu Graduate Student Academic Forum, Jinan, China, Oct. 2010. (In Chinese)
2. **Zhang Q**, Yang J, Li L, Li B and Liu C. Study of pulse rate variability using bispectrum analysis. The 4th International Conference on Bioinformatics and Biomedical Engineering (iCBBE), Chengdu, China, June 2010.
3. Li L, Liu C, Liu C, **Zhang Q** and Li B. Physiological signal variability analysis based on largest Lyapunov exponent. The 2nd International Congress on Image and Signal Processing (CISP) and the 2nd International Conference on BioMedical Engineering and Informatics (BMEI), Tianjin, China, Oct. 2009.
4. Liu C, Liu C, Li L, **Zhang Q** and Li B. Systolic and diastolic time interval variability analysis and their relations with heart rate variability. The 3rd International Conference on Bioinformatics and Biomedical Engineering (iCBBE), Beijing, China, June 2009.
5. **Zhang Q**, Liu C, Li L, Sun C and Liu C. Study of pulse rate variability based on approximate entropy. The Annual Conference of Biomedical Engineering, Chongqing, China, Oct. 2009. (In Chinese with English Abstract)

Selected Presentations (select from 27 conference oral/poster presentations)

1. **Zhang Q**, Bennett HC, Kim Y, Drew PJ. Neurovascular coupling is preserved in healthy, aged mice. The 10th International Society for Neurovascular Disease Annual Meeting, New York, NY, Jul. 2022.
2. **Zhang Q**, Roche M, Gheres KW, Chaigneau E, Haselden WD, Charpak S and Drew PJ. Cerebral oxygenation dynamics in awake behaving mice. Optics and the Brain, Fort Lauderdale, FL, Apr. 2022.
3. **Zhang Q**, Roche M, Gheres KW, Chaigneau E, Haselden WD, Charpak S and Drew PJ. Cerebral oxygenation during locomotion is modulated by respiration. BMES Annual Meeting, Philadelphia, PA, Oct. 2019.
4. **Zhang Q**, Gheres KW and Drew PJ. Noradrenergic modulation of neurovascular coupling in awake behaving mice. The 47th Annual Meeting of the Society of Neuroscience. Washington, DC, Nov. 2017.
5. **Zhang Q,** Anderson DA, Gheres KW, Winder AT and Drew PJ. Serotonergic and noradrenergic modulation of neurovascular coupling in awake behaving mice. The 46th Annual Meeting of the Society of Neuroscience. San Diego, CA, Nov. 2016.
6. **Zhang Q**, Knapp CF, Smith JD and Evans JM. Cardiovascular responses to orthostatic stress after 90 minutes head-down bed rest versus artificial gravity exposure in hypovolemic men and women. Experimental Biology, San Diego, CA, Apr. 2014.
7. **Zhang Q**, Stenger MB, Matz TP, Knapp CF, Patwardhan AR and Evans JM. Left ventricular diastolic function during head up tilt and hypovolemia. BMES Annual Meeting, Seattle, WA, Sep. 2013.
8. **Zhang Q,** Evans JM, Knapp CF, Falvo MJ, Moore FB, Patwardhan AR and Serrador JM. Cardio- and cerebro-vascular control in men and women with furosemide-induced hypovolemia during artificial gravity exposure by short radius centrifuge. Experimental Biology, Boston, MA, Apr. 2013.
9. **Zhang Q**, Kostas VI, Wang S, Stenger MB, Knapp CF and Evans JM. Cardiovascular responses of men and women to orthostasis in simulated Lunar and Martian gravities. BMES Annual Meeting, Atlanta, GA, Oct. 2012.

Teaching

2023 NEURO 521: Systems Neuroscience, Penn State
- Guest Lecturer (Graduate Level)
- Calcium signal imaging of neuronal activity

- Peer teaching evaluations available upon request

2022 BIO/BBH 470: Functional and Integrative Neuroscience, Penn State
- Guest Lecturer (Undergraduate Level)
- In vivo functional imaging techniques
- Peer teaching evaluations available upon request

2019, 2022 NEURO 520: Cellular and Molecular Neuroscience, Penn State
- Guest Lecturer (Graduate Level)
- Interaction between respiratory center and locus coeruleus (2019)
- Calcium signal imaging (2022)
- Peer teaching evaluations available upon request

2018 ESC 555: Fundamentals of Data Analysis in Neuroscience, Penn State
- Guest Lecturer (Graduate Level)
- Spectral analysis for neural signals
- Peer teaching evaluations available upon request

2009-2011 Cardiovascular Mathematics: Modeling and Simulation of Circulatory System
- Teaching Assistant (Undergraduate Level), Shandong University, China

2009-2011 Biomedical Sensors and Instruments (Lab)
- Teaching Assistant (Undergraduate Level), Shandong University, China

Professional Service and Memberships

Professional Memberships

2022-2023	Member, International Society for Neurovascular Disease
2016-present	Member, Society for Neuroscience
2016-present	Member, American Heart Association
2012-2020	Member, Biomedical Engineering Society

Journal Reviewer

Frontiers in Neuroscience; Scientific Reports; PLoS ONE; Journal of Neuroscience Methods; Philosophical Transactions of The Royal Society B; Gravitational and Space Research; Innovation and Research in Biomedical Engineering; Signal Processing; Medical & Biological Engineering & Computing

Mentorship

Graduate Students (rotation mentor, PI: Dr. Patrick Drew)

2022	Grace Smith	Penn State, Biomedical Engineering
2022	Junyao Yuan	Penn State, Physiology
2022	Farzad Azarmi	Penn State, Biomedical Engineering
2021	Deborpita Sarkar	Penn State, Veterinary and Biomedical Sciences
2020	Ryan Chang	Penn State, Medical Scientist Training Program
2020	Tim Morrow	Penn State, Biomedical Engineering
2019	Alexander Mendoza	Penn State, Neuroscience
2016	Wenyu Tu	Penn State, Neuroscience

Undergraduate Student Researchers

2022-present	Marceline Mostafa	Penn State, Millennium Scholars Program
2022	Renee Laurenzana (California State University, San Marcos)	Penn State, Summer Research Opportunities Program
2021-2022	Young-Joon Kim	Penn State, Biomedical Engineering
2018-2019	Serea Phillips	Penn State, Millennium Scholars Program
2017-2018	Ray Watkins	Penn State, Engineering Science and Mechanics
2011-2014	Connor Ferguson	University of Kentucky, Mechanical Engineering