

Abuzar Mahmood

Volen Center for Complex Systems
Brandeis University, Waltham, MA
abuzarmahmood@brandeis.edu | [Google Scholar](#) | [GitHub](#)

A. Education

Ph.D. in Neuroscience, Brandeis University, Waltham, MA GPA: 3.98 | Expected February 2023
M.S. in Neuroscience, Brandeis University, Waltham, MA GPA: 3.96 | 2019
B.S. in Physics, University of Missouri, Columbia, MO GPA: 3.95 (Summa Cum Laude) | 2017
– Minors in Mathematics, Chemistry, Biology, and Computational Neuroscience

B. Research Experience

Postdoctoral Researcher, Brandeis University, MA Starting April 2023
– *Project*: Dynamics of information flow during the evoked taste response
Ph.D. Researcher, Brandeis University, MA 2017 – Feb 2023
– *Thesis Advisor*: Donald B. Katz
– *Thesis Title*: Multi-region Coordination for Taste Processing in the Rodent Brain
Data Science Intern, TrackstarHQ, NY 2022
– Developed computational models to detect outliers and changepoints in online timeseries data
Undergraduate Researcher, University of Missouri, MO 2013-2017
– *Research Advisor*: Lakshmi Pulakat
– Multiple projects involving investigation of novel pharmaceutical drugs for treatment of cardiovascular disease and diabetes.

C. Publications

1. Belenchia, A.M., Boukhalifa, A., Demarco, V.G., Mehm, A., **Mahmood, A.**, et al., NP-6A4, a new cardioprotective autophagy activating AT2R agonist, attenuates cardiac dysfunction and coronary microvascular damage in female rat with untreated obesity (*In Preparation*)
2. **Mahmood, A.**, Steindler, J., Germaine, H., Katz, D.B., Coupled Dynamics of Stimulus-Evoked Gustatory Cortical and Basolateral Amygdalar Activity, *Journal of Neuroscience*, vol. 43, no. 3, Jan. 2023, pp. 386–404. www.jneurosci.org, <https://doi.org/10.1523/JNEUROSCI.1412-22.2022>.
3. Stone, B.T., Lin, J.-Y., **Mahmood, A.**, Sanford, A.J., and Katz, D.B. (2022). LiCl-induced sickness modulates rat gustatory cortical responses. *PLOS Biology* 20, e3001537. <https://doi.org/10.1371/journal.pbio.3001537>.
4. **Mahmood, A.***, Gavini, M.P.*, Belenchia, A.M., Beauparlant, P., Kumar, S.A., Ardhanari, S., DeMarco, V.G., and Pulakat, L. (2021). Suppression of Inflammatory Cardiac Cytokine Network in Rats with Untreated Obesity and Pre-Diabetes by AT2 Receptor Agonist NP-6A4. *Frontiers in Pharmacology* 12. (* Co-first Authors)
5. Lin, J.-Y., Stone, B.T., Herzog, L.E., Nanu, R., **Mahmood, A.**, and Katz, D.B. (2021). The function of groups of neurons changes from moment to moment. *Current Opinion in Physiology* 20, 1–7. <https://doi.org/10.1016/j.cophys.2020.12.002>.
6. Lum-Naihe, K., Toedebusch, R., **Mahmood, A.**, Bajwa, J., Carmack, T., Kumar, S.A., Ardhanari, S., DeMarco, V.G., Emter, C.A., and Pulakat, L. (2017). Cardiovascular disease progression in female Zucker Diabetic Fatty rats occurs via unique mechanisms compared to males. *Sci Rep* 7, 17823. <https://doi.org/10.1038/s41598-017-18003-8>.

7. Luck, C., DeMarco, V.G., **Mahmood, A.**, Gavini, M.P., and Pulakat, L. (2017). Differential Regulation of Cardiac Function and Intracardiac Cytokines by Rapamycin in Healthy and Diabetic Rats. *Oxidative Medicine and Cellular Longevity* 2017, 1–17. <https://doi.org/10.1155/2017/5724046>.
8. Arnold, N., **Mahmood, A.**, Ramdas, M., Ehlinger, P.P., and Pulakat, L. (2017). Regulation of the cardioprotective adiponectin and its receptor AdipoR1 by salt. *Can. J. Physiol. Pharmacol.* 95, 305–309. <https://doi.org/10.1139/cjpp-2016-0570>.
9. Gul, R., **Mahmood, A.**, Luck, C., Lum-Naihe, K., Alfadda, A.A., Speth, R.C., and Pulakat, L. (2015). Regulation of cardiac miR-208a, an inducer of obesity, by rapamycin and nebivolol. *Obesity* 23, 2251–2259. <https://doi.org/10.1002/oby.21227>.
10. **Mahmood, A.**, and Pulakat, L. (2015). Differential Effects of β -Blockers, Angiotensin II Receptor Blockers, and a Novel AT2R Agonist NP-6A4 on Stress Response of Nutrient-Starved Cardiovascular Cells. *PLOS ONE* 10, e0144824. <https://doi.org/10.1371/journal.pone.0144824>.

D. Poster Presentations

1. **Mahmood A.**, Steindler J., Stone BT., Katz D. B., *Gustatory Cortex and Basolateral Amygdala Communication in Innate Taste Processing*
 - **First Place**, Graduate Poster Competition, Volen Center for Complex Systems Retreat (Sept 2021)
 - International Symposium on Olfaction and Taste, Portland (August 2020)
2. **Mahmood A.**, Luck C., DeMarco VG., Gavini M., and Pulakat L., *Differential Regulation of Cardiac Function and Intracardiac Cytokines by Rapamycin in healthy and diabetic rats*, University of Missouri Cardiovascular Day XXIV Poster Competition (Feb 2017)
 - **First Place**, Undergraduate Competition
3. **Mahmood A.**, Gavini M., Senthilkumar A., Carmack T., DeMarco V., and Pulakat L., *Investigating the role of the Angiotensin II Type 2 Receptor in Protective Cardiac Remodeling*, University of Missouri Summer Forum (July 2016)
4. **Mahmood A.**, Raja A., Gavini M., and Pulakat L., *Droplette- a Novel Method of Low-Pressure Transdermal Delivery to Chronic Wounds*, Missouri Life Sciences Week (Apr 2016)
 - **First Place**, Undergraduate Competition, Life Science and Biomedical Engineering Technologies and Informatics category
5. **Mahmood A.**, and Pulakat L., *Improved Survival of Nutrient-Starved Human and Mouse Cardiovascular Cells by A Novel AT2 Receptor Agonist NP-6A4*
 - Nutrition and Exercise Physiology Corporate Affiliate Board Meeting (Nov 2015)
 - University of Missouri Health Sciences Research Day (Nov 2015)
6. **Mahmood A.**, and Pulakat L., *Nutrient Stress Response of Cardiovascular Cells to β -Blockers, ARB and AT2R Agonists*
 - University of Missouri Undergraduate Research and Creative Achievements Summer Forum (July 2015)
 - Harry S. Truman VA Research Week Poster Competition (Sept 2015)
 - Hypertension 2015 Scientific Sessions by Lakshmi Pulakat (Sept 2015)
7. **Mahmood A.**, Gul R., Luck C., and Pulakat L., *Role of Cardiac mir-208a in Nebivolol-Mediated Signaling*, Experimental Biology-Boston (March 2015)
8. **Mahmood A.**, and Pulakat L., *Differential Effects of β -Blockers and a Novel AT2R Agonist on Cardiovascular Cells*
 - **Awarded Distinction**, University of Missouri Cardiovascular Day XXII Poster Competition (Feb 2015)
 - Missouri Life Sciences Week Poster Competition (April 2015)
 - University of Missouri Undergraduate Research and Creative Achievements Spring Forum (April 2015)

9. **Mahmood A.**, and Pulakat L., *Electrical Impedance-Based Measurement of Cardiomyocyte Response to Cardio-protective Drugs*, University of Missouri Health Sciences Research Day (Nov 2014)
10. **Mahmood A.**, Gul R., and Pulakat L., *Modulation of Electrical Impedance of cardiomyocytes by Nebivolol and novel AT2 Receptor Agonists*
 - Harry S. Truman VA Research Week Poster Competition (May 2014)
 - Missouri Life Sciences Week Poster Competition (April 2014)

E. Co-Authored Posters

1. Pulakat L., **Mahmood A.**, Belenchia A., Gavini M., Liu P., Mooney B., Tang Y., Mehm A., and Demarco V.G., *Sex Differences in Treatment Responses to NP-6A4, a Cardiomyopathy Drug With the FDA Designation, in Heart Disease Induced by Untreated Obesity*, American Heart Association Meeting (Nov 2021)
2. Maigler K.M., Stone B.T., **Mahmood A.**, Lin J.Y., and Katz D.B., *The Contribution of Lateral Hypothalamus to Cortical Palatability Coding*, Association for Chemoreception Science Meeting (April 2021)
3. Stone B.T., **Mahmood A.**, Lin J.Y., and Katz D.B., *Representation of Illness and its Functional Impact on Gustatory Processing*, International Symposium on Olfaction and Taste, Portland (August 2020)
4. Gavini, M.P., **Mahmood, A.**, Belenchia, A.M., Beauparlant, P., Kumar, S.A., Ardhanari, S., DeMarco, V.G., and Pulakat, L., *Activation of AT2 Receptor by NP-6A4 Improves Cardiac Function by Inducing a Novel Cardio-Reparative Protein-Micro RNA Network in Zucker Obese Rats With Untreated Obesity and Diabetes*, American Heart Association Meeting (Nov 2019)
5. Pulakat, L., Gavini, M.P., **Mahmood, A.**, Belenchia, A.M., Beauparlant, P., Kumar, S.A., Ardhanari, S., and DeMarco, V.G., *Attenuation of Cardiac Fibrosis, Hypertrophy and Myopathy by AT2R Agonist NP-6A4*, AHA Hypertension Meeting (Sept 2017)
6. Belenchia A.M., Beauparlant P., **Mahmood A.**, Bajwa J., Zhang Q., Khare S., and Pulakat L., *Cardiovascular Protective vs. Anti-Cancer Properties: Novel Actions of the AT2R Agonist, NP-6A4*, Experimental Biology Meeting (April 2017)
7. Toedebusch R., Lum-Naihe K., **Mahmood A.**, Bajwa J., Kumar S., Ardhanari S., Demarco V., and Pulakat L., *Mechanistic insights into diabetes and the progression of cardiovascular disease in female rats*, Experimental Biology Meeting (April 2017)
8. Beauparlant P., **Mahmood A.**, Toedebusch R., Kumar S., Ardhanari S., Demarco V., and Pulakat L., *Cardiovascular Protective Effects of AT2R Activation by Peptide Drug NP-6A4*, Experimental Biology Meeting (April 2017)
9. Lum-Naihe, K., Toedebusch, R., **Mahmood, A.**, Bajwa, J., Carmack, T., Kumar, S.A., Ardhanari, S., DeMarco, V.G., Emter, C.A., and Pulakat, L., *Sex Differences in the Expression of Cardiac miR-29 Family microRNAs in Diabetic Male and Female Rats and its Correlation with Increased Risk for Cardiac Damage in Diabetic Females*, Missouri Life Sciences Week (April 2016)
 - **Honorable Mention**, Graduate Competition, Molecular and Cellular Biology
10. Bajwa J., **Mahmood A.**, Gavini M., Pulakat L., *Regulation of Neuroprotective Myeloid Cell Leukemia 1 by Rapamycin and AT2R Agonists in Dopaminergic Neuronal Cell Line*, Hypertension 2015 Scientific Sessions- Washington DC (Sept 2015)
11. Lum-Naihe K., Raja A., Jamal B., **Mahmood A.**, Luck C., Emter C., Pulakat L., *Sex Differences in the Progression of Diabetes-associated Cardiac Pathology*, Experimental Biology-Boston. (March, 2015)
12. Arnold N., **Mahmood A.**, Ramdas M., and Pulakat L., *Suppression of the Cardio-protective molecule Adiponectin via a High-Salt Diet: A Potentially Pivotal Mechanism of Atherosclerosis in Salt-Induced Hypertension & Heart Disease*, University of Missouri Health Sciences Research Day (Nov 2014)

F. Invited Talks

- **Mahmood A.**, *An Intro to Bayesian Modelling and Probabilistic Programming*, Brandeis University, MA (July 2022)
- **Mahmood A.**, Steindler J., Stone BT., Katz D. B., *Gustatory Cortex and Basolateral Amygdala Communication in Innate Taste Processing*, NIH Blueprint Joint Symposium on Computational Neuroscience (June 2021)
- **Mahmood A.**, Katz D. B., *The Nonlinear Population Dynamics of Cortical Taste Processing*, Systems/Computational Neuroscience Journal Club, Brandeis University, MA (March 2019)

G. Teaching

Brandeis University

1. *Advanced Data Analysis*, with Dr. Shantanu Jadhav 2021
 - Guest lectures on unsupervised clustering, Hidden Markov Modeling, and Probabilistic Programming and Bayesian Modeling
2. *Applied Statistical Computing in R*, Teaching Assistant with Prof. Xiaodong Liu 2019
3. *Computational Neuroscience*, Teaching Assistant with Dr. Leandro Alonso 2019
 - Guest lectures on “*Detecting circuit structure and non-random features in a connectivity matrix*” and “*Principal Component Analysis*”.
4. *Quantitative Skills Center*, Tutor 2019
5. *Data Analysis and Statistics Workshop*, Teaching Assistant with Prof. Paul Miller 2018

H. Mentorship

Katz Lab, Brandeis University,

- Hannah Germaine, PhD Rotation Student, Computation Modeling and Data Analysis 2022
- Victor Suarez, PhD Rotation Student, Data Analysis 2020
- Jessica Steindler, Post-Baccalaureate Researcher, Hardware construction, surgery, and data collection 2019-2021
- Thomas Murdy, Undergraduate Researcher, Surgery, data collection, and analysis 2020-21
 - Undergraduate Thesis awarded **High Honors**

Pulakat Lab, University of Missouri

- Paige Beauparlant, Undergraduate student, data collection and experimental procedure 2017
- Laura Perry, Undergraduate student, data collection and experimental procedure 2017
- Jamal Bajwa, Undergraduate student, data collection, experimental procedure, and data analysis 2016-17

I. Awards and Funding

Brandeis University

- XSEDE Research Award, NSF, \$13,600 2019-2022
- Computational Neuroscience Training Fellowship, NIH, \$140,000 2017-2019
- Academic Hardware Grant, NVIDIA, \$9000 2018

University of Missouri

- Award for Academic Distinction 2017

- Awarded to 10 students out of 23,000 every year
- Clifford W. Tompson Scholarship, Department of Physics 2016 - 2017
- Curator's Grant in Aid Award, International Center 2015 - 2017
- Col. Arthur C. Allen Scholarship, College of Arts and Science 2015 - 2017
- Dean's List, College of Arts and Science 2013 - 2017
- International Merit Scholarship, International Center 2013 - 2017
- Junior Scholarship Award, Honors College 2016
- Life Sciences Undergraduate Research Opportunity 2016
 - Project Title: Investigating the Role of the Angiotensin II Type 2 Receptor in Protective Cardiac Remodeling
 - Project Advisor: Lakshmi Pulakat
- Rosemary Dishman Scholarship, Department of Physics 2015
- Sophomore Scholarship Award, Honors College 2015
- Undergraduate Research Travel Award, Office of Undergraduate Research 2015
 - Awarded to present at Experimental Biology - Boston
- Newell S. Gingrich Undergraduate Scholarship, Department of Physics 2014
- Paul E. Basye Scholarship, Department of Physics 2014

J. Technical Skills

Experimental

Stereotactic rodent surgeries, chronic implantation of multielectrode bundles and optical fibers

Software

Python, R, MATLAB, and Linux. MySQL and PostgreSQL (pgAdmin4, psycopg2). Experience working with computing cluster environments at Brandeis and at XSEDE (Jetstream)

Modeling

- Machine Learning: Standard models for regression/classification, probabilistic graphical models (time-series models like HMMs and changepoint models), Bayesian inference (including nonparametric priors with MCMC and black-box variational inference)
- Statistics: Frequentist techniques (parametric/non-parametric), Bayesian statistics (Hierarchical models, MCMC), computational neuroscience models (e.g, point-process models, drift-diffusion model of decision-making).
- Frameworks: numpy, scipy, scikit-learn, Tensorflow/Keras, PyMC3