Jennifer K Briggs

Ph.D. Bioengineering Candidate University of Colorado Denver | Anschutz Medical Campus

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About Me

I am a PhD Candidate in Bioengineering at the University of Colorado Anschutz Medical Campus. I graduate August 2025 and am excited about new opportunities. I have been recognized as a National Science Foundation Graduate Research Fellow (NSF GRFP) and Special Interest Group in High Power Computing Association for Computing Machinery (SIGHPC ACM) Fellow. With expertise in statistical inference, dynamical systems theory, and computational physiology, I bring a cross-disciplinary approach to both teaching and research. My work focuses on applying innovative computational methods from complexity science, nonlinear dynamics, machine learning, and data assimilation to biomedicine, with a particular interest in advancing mechanistic insights and building clinical decision support tools for the cerebral vascular and glucose endocrine systems.

Education

University of Colorado Anschutz — *Aurora, Co*
Ph.D. Bioengineering, **GPA:** 4.0 — *May 2020 - 2025 (Expected Aug 1)*

- **Notable awards and certifications: NSF Graduate Research Fellow** (2021-2025), **SIGHPC Association for Computational Machinery Fellowship Recipient** (2023), Concordia Consortium for Study of Diabetes Fellow (2024), Santa Fe Institute Complexity Systems Summer School (2022)

Sante Fe Institute — *Sante Fe, NM*
Complexity Systems Summer School — *2022*

- Month long intensive education on state of the art Complexity Science

Pepperdine University — *Malibu, CA*
B.S. Double Major: Physics and Sports Medicine, **Minor**: Applied mathematics — *Aug 2016 - May 2020*

- **GPA:** 3.9/4.0, *Summa Cum Laude*
- **Notable awards**: **Natural Science Student of the Year (out of ∼200 students)**, **Physics Student of the Year**, Edison Achievement Scholarship ($12000/year), Faculty and Staff Scholarship ($5000/year), Rosemarry Raitt Endowed Scholarship ($12000/year), Natural Science Award, Pepperdine Grant

Fellowships

2024-2027 **Concordia Coalition for Diabetes,** Diabetes Center, University of Colorado | Anschutz Medical Campus
2022-2026 **Special Interest Group of High Power Computing Fellowship,** Association of Computational Machinery
2021-2025 **National Science Foundation Graduate Research Program Fellowship,** Physics of Living Systems
2020-2025 **Bioengineering Fellowship,** University of Colorado | Anschutz Medical Campus
2020-2025 **Werner and Kitty Hirs Fellowship,** University of Colorado | Anschutz Medical Campus
2020 **Hertz Fellowship,** Honorable Mention (Second Round Interview)

Technical Expertise

Data Science Health Care Analytics, Artificial Intelligence, Machine Learning, Signal Processing, Image Processing, Optimization, Data Assimilation
Modeling & Simulation ODE-based Simulations, Dynamical Systems, Physiological and Multiphysics Modeling
Software & Tools MATLAB, Python, R, High-Performance Computing (NVIDIA clusters, Linux)

Research Experience (publications below)

Complexity and Dynamical Systems in Biomedicine — *Aurora, Co*
Departments of Bioengineering and Biomedical Informatics, University of Colorado Anschutz — *2020-Present*

- Thesis: *Computational and Dynamical Systems Approaches to Infer Unobserved Processes for Biomedical Applications in Diabetes and Cerebral Vascular Regulation*
- Developed, validated, and estimated a novel ordinary differential equations model of cerebral blood flow using Markov Chain Monte Carlo to serve as a **digital twin for clinical decision support.** Achieved a sevenfold improvement in cerebral blood flow prediction accuracy compared to deep learning models.
- Trained deep learning and machine learning algorithms for **predictive modeling of complex clinical datasets**, including electronic health records.
- Simulated an electrophysiologic model of the islet using **signal processing**, network theory, and information-theoretic methods to **identify novel physiological mechanisms underlying diabetes**.
- Documented technical findings in peer-reviewed publications and presented at international conferences, including: **European Association for the Study of Diabetes, American Diabetes Association, Biophysical Society, Society of Industrial and Applied Mathematics**.

Heliospheric Research Intern — *Maryland and California*
NASA Goddard and Pepperdine University — *2017-2020*

- **Multimodel timeseries and Image analysis:** Analyze magnetospheric-ionospheric interactions and discovered never-before-documented ionospheric phenomena *See Press Release Below*.

Publications

Published (Listed in Chronological Order)

• **Briggs, J. K.,** Stroh, J. N., Foreman, B., Park, S., TRACK-TBI Study Investigators, Bennett, T. D., & Albers, D. J (2025). Personalizing the Pressure Reactivity Index for Neurocritical Care Decision Support. IEEE Transactions on Biomedical Engineering.Read here

• Jin, E.*, **Briggs, J. K.***, Benninger, R. K., & Merrins, M. J. (2024). Glucokinase activity controls subpopulations of β-cells that alternately lead islet Ca2+ oscillations. eLife, 13. *Equal ContributionRead here

• Gresch, A., Osthues, J., Hüwel, J.D., **Briggs, J.K.**, Berger, T., Koch, R., Deickert, T., Beecks, C., Benninger, R.K. and Düfer, M., 2024. Resolving spatiotemporal electrical signaling within the islet via CMOS microelectrode arrays. Diabetes, p.db230870. **Selected as publication of the month*

• Stroh, J. N., Foreman, B., Bennett, T. D., **Briggs, J.K.,** Park, S., & Albers, D. (2024). Intracranial pressure-flow relationships in traumatic brain injury patients expose gaps in the tenets of models and pressure-oriented management. Frontiers in Physiology. 2024;15. Read here

• Fasel, G.J., Lee, L.C., Lake, E., Csonge, D., Yonano, B., Bradley, O., **Briggs, J.K.**, Lee, S.H., Mann, J., Sigernes, F. & Lorentzen, D., (2024). Correlation between the solar wind speed and the passage of poleward-moving auroral forms into the polar cap. Frontiers in Astronomy and Space Sciences, 2024;10 Read here

• **Briggs, J. K.,** Gresh, A., Marinelli, I., Kravets, V., Dwulet, J. M., Albers, D. J., & Benninger, R. K. (2023). Beta-cell intrinsic dynamics rather than gap junction structure dictates subpopulations in the islet functional network. Elife, 12 (2023): e83147. **Highlighted with commentary.*Read here

• **Briggs, J. K.,** Schonblum, A., Landsman, L., & Benninger, R. K. (2022). Going With the Flow: Pericyte-Regulated Islet Blood Flow Influences Glucose Homeostasis. Diabetes, 71(8), 1611-1613. Read here

• Adams, M. T., Dwulet, J. M., **Briggs, J. K.,** Reissaus, C. A., Jin, E., Szulczewski, J. M., ... & Blum, B. (2021). Reduced synchroneity of intra-islet Ca2+ oscillations in vivo in Robo-deficient β cells. Elife, 10, e61308. Read here

• Dwulet, J. M., **Briggs, J. K.,** & Benninger, R. K. (2021). Small subpopulations of β-cells do not drive islet oscillatory [Ca2+] dynamics via gap junction communication. PLoS computational biology, 17(5), e1008948. Read here

• **Briggs, J. K.,** Fasel, G. J., Silveira, M., Sibeck, D. G., Lin, Y., & Sigernes, F. (2020). Dayside auroral observation resulting from a rapid localized compression of the Earth's magnetic field. Geophysical Research Letters, 47(19), e2020GL088995. Read here

Pre-print/Submitted

• **Briggs, J. K.**, Stroh, J. N., Park, S., Foreman, B., Tymko, M., Carr, J., Sirlanci, M., Ainslie, P., Benninger, R. K. P., Bennett, T. D., & Albers, D. J. (2025). Physics-informed digital twin can predict cerebral blood flow and cerebral vascular regulation mechanisms in neurocritical care patients (Submitted 2025) Read here

• Levitt, C. H., Isaacs, D., Hansen, M. S., Kravets, V., **Briggs, J. K.**, & Benninger, R. K. (2024). Diminished gap junction coupling under diabetogenic conditions does not drive loss of functional β-cell sub-populations. (Submitted 2024).Read here

• **Briggs, J. K.,** Jin, E., Merrins, M. J., & Benninger, R. K. CRISP: correlation-refined image segmentation process. BioRxiv. (Submitted 2024)Read here

Conferences and Invited Talks

Society of Industrial and Applied Mathematics	**Briggs, J. K.**, et al., (2025, May). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care
American Medical Informatics Association Annual Symposium	**Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J. (2024, November). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care **Featured in AMIA Top 20 Symposia*
Biomedical Engineering Society Annual Meeting	**Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J. (2024, October). Engineering a Cerebral Hemodynamics Model within a Data Assimilation Pipeline to Enhance Clinical Decision Support in Neurocritical Care
Concordia Coalition for the Study of Diabetes	**Briggs, J. K.**, (2024, September). Computational Methods for Diabetes Research
European Association for the Study of Diabetes	**Briggs, J. K.**, Jin, E., Merrins, M., Benninger, R. K., (2024, September). High-speed 3D Lightsheet Calcium Imaging of Pancreatic Islets Sheds New Light on Beta Cell Heterogeneity
University of Colorado Department of Biomedical Informatics Annual Retreat	**Briggs, J. K**, (2024, August). Cerebral Hemodynamics Modeling to Enhance Clinical Decision Support in Neurocritical Care
American Diabetes Association	Reusch, J.E.B, **et al.**, (2024, June). Endothelial Injury Predicts Carbohydrate Metabolism Trajectories after COVID-19
Diabetes Day	**Briggs, J. K.**, Jin, E., Merrins, M., Benninger, R. K., (2024, March). High-resolution 3D Calcium Time Course Imaging Sheds New Light on Beta Cell Heterogeneity **Awarded Best Talk*
American Diabetes Association	**Briggs, J. K.**, Jin, E., Merrins, M., Benninger, R. K., (2023, July). Islet Ca2+ Dynamics, Heterogeneity, and Consistency in Three Dimensions with Activators of Pyruvate Kinase
Invited Talk: Columbia University Irving Medical Center Department of Neurocritical Care	**Briggs, J. K.** (July 2023) Two Neurovascular Feedback Informed Precision Medicine Approaches For Neurocritical Care Patients
Invited Talk: Columbia University Department of Biomedical Informatics	**Briggs, J. K.** (July 2023) Bioinformatics for Informed Precision Medicine Approaches For Neurocritical Care Patients
Invited Talk: UC Davis	**Briggs, J. K.** (June 2023) Complex Systems Methods Provide Insight into Islet Heterogeneity and Function.
SIAM Dynamical Systems	**Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2023, June).A Cerebral Hemodynamic Model with Temporally Informed Vascular Regulation Processes to Guide Clinical Decision Support

Intracranial Pressure Monitoring **Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). New Model of Cerebral Hemodynamics which Includes Cerebral Vascular Feedback to Aid in Clinical Decision Support

Intracranial Pressure Monitoring **Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). Defining Optimal Methodology and Quantifying Uncertainty in Pressure Reactivity Index for Clinical Decision Support

American Medical Informatics Association **Briggs, J. K.**, Stroh, J. N., Foreman, B., Park, S., Bennett, T., Albers, D. J., (2022, November). Defining Optimal Methodology and Quantifying Uncertainty in Pressure Reactivity Index for Clinical Decision Support

European Association for the Study of Diabetes Annual Meeting **Briggs, J. K.**, Kravets, K., Dwulet, J.M., Albers, D.J., Benninger, R. K. (2022, September). Quantifying the relationship between emergent islet function, gap junctions, and beta cell dynamics: a network theory approach *Travel Grant Recipient

Biophysical Society Annual Meeting **Briggs, J. K.**, Kravets, K., Dwulet, J.M., Benninger, R. K. (2022, February). Probing the Relationship Between Functional And Structural Networks in the Pancreatic Islet.

Biophysical Society Annual Meeting Dwulet, J.M., **Briggs, J. K.**, Benninger, R. K. (2022, February). The role of highly functional β-cell subpopulations in the multicellular islet.

American Geophysical Union Fall Conference **Lau, J.**, et al. (2019, December). Ionospheric Response to a Transient Event at the Magnetopause.

American Geophysical Union Fall Conference Fasel, G.J., **et al.** (2019, December). East-West Brightening in Poleward-Moving Auroral Forms and the Interplanetary Magnetic Field By -Component.

American Geophysical Union Fall Conference Butler, K., **et al.** (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.

American Geophysical Union Fall Conference Mann, J.C., **et al**. (2019, December). Dayside Auroral Oval Shifts Due to Enhanced Solar Wind Dynamic Pressure.

American Geophysical Union Fall Conference Fasel,G.J., **et al.** (2017, December). What Solar Wind Conditions Produce Poleward Moving Auroral Forms?

Teaching

University of Colorado Anschutz *Aurora, Co*
Analytical Methods and Machine Learning: Teaching Assistant *2022-2023*
- Topics included: measure theory, linear algebra, dynamical systems, differential equations, time series analysis, regression, regularization, support vector machines, etc.
- Wrote and taught weekly recitations, assisted professor in lesson planning, graded homework and exams

University of Colorado Anschutz *Aurora, Co*
Bioengineering Lab: Teaching Assistant *2022-2023*

University of Colorado Denver Bioengineering Empowerment Program *Aurora, Co*
Guest Lecturer *2021-2022*
- Provided guest lectures on informatics and the scientific process to underrepresented high school student

High School AP Calculus and Independent Research Methods *Aurora, Co*
Private Tutor *2022-Present*
- Private tutoring and mentoring indpendently and through Polygence

Self Employed *Malibu, Ca*
Physics, Mathematics, and Physiology Tutor *2017-2020*

Emily Shane Foundation in partnership with the boys and girls club *Malibu, Ca*
Academic mentor for low income students *2017*

Additional Experience

Polygence
Research Mentor *2024-Present*

University of Colorado Anschutz *Aurora, Co*
Member of Department of Biomedical Informatics Seminar Committee *2024-Present*

University of Colorado Anschutz *Aurora, Co*
Member of Department of Biomedical Informatics Educational Committee *2022-Present*

New Life Community Church *Aurora, Co*
High School Mentor for 50 highschoolers *2020-Present*

Clear Direction Mentoring *Aurora, Co*
STEM Mentor for underrepresented, underprivileged high schoolers *2021-2022*

Pepperdine University *Malibu, Ca*
Pepperdine Physics Club President *2018-2020*
- Organized, planned and executed large events with emphasis on enhancing community and sharing science with public
- Applied for grants and apprehend funding to hold events

Mission at Natuvu Creek *Vanua Levu, Fiji*
Medical and Educational Volunteer *June 2018*
- Diagnosed and treated medical and dental needs for 100 citizens of Vanua Levu, Fiji
- Taught astronomy, math, and physics a class of high school students

Pepperdine University *Malibu, Ca*
Spiritual Life Resident Advisor (On-Call) *2017–2018*

Press

- 2022 ACM SIGHPC Computational and Data Science Fellowship Winners
- Briggs receives NSF Graduate Research Fellowship
- American Geophysical Union 'Postcards from the edge of space: New images, new phenomena, and new insights.' AGU Press Release 10 Dec. 2019 Forbes, Business Insider, NASA

Professional References

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