

# Chisondi S. Warioba, PhD

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Stanford University School of Medicine  
Department of Anesthesiology, Perioperative and Pain Medicine  
Division of Pain Medicine  
1070 Arastradero Road, Suite 200, Palo Alto, CA 94304

## Academic Appointments

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### T32 Postdoctoral Scholar

May 2025 – Present

Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine, Division of Pain Medicine

Principal Investigator: Sean Mackey, MD, PhD

## Education

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### Ph.D., Medical Physics

September 2021 – June 2025

University of Chicago, Chicago, IL

Dissertation: “Cross-Species Mapping of Functional Connectivity Alterations and Therapeutic Responses in Hyper-Acute Ischemic Stroke”

Advisor: Timothy J. Carroll, PhD

### B.S. Chemistry, B.A. Physics, B.A. Biology (Triple Major)

September 2017 – June 2021

Westmont College, Santa Barbara, CA

Summa Cum Laude | GPA: 3.96/4.00

Major Honors Thesis in Chemistry (Grade: A+): “Computational Study on the Role of Zn(II) Z-Type Ligands in Facilitating Diaryl Reductive Elimination from Pt(II)”

## Research Interests

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Neuroimaging biomarkers for pain and neurological disorders; machine learning and deep learning for high-dimensional medical data; cross-species translational neuroscience; resting-state fMRI and diffusion MRI analysis; computational approaches to brain-behavior relationships; geometric frameworks for signal processing in neuroimaging.

## Publications

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### Peer-Reviewed Journal Articles

7. **Warioba, C.S.** (2025). Rotational Invariance in Resting-State fMRI: A Geometric Framework for Understanding Signal Processing and Connectivity. *Concepts in Magnetic Resonance Part A*, accepted.
6. **Warioba, C.S.** (2025). A manifold alignment framework enables cross-species translation of functional connectivity biomarkers in ischemic stroke. *NeuroImage: Reports*, under review.
5. **Warioba, C.S.** (2025). Coloring Outside the Lines: A Mathematical Adventure in Segregation Mapping. *Math Horizons*, DOI: 10.1080/10724117.2025.2541583.
4. **Warioba, C.S.**, Carroll, T.J., & Christoforidis, G.A. (2024). Flow Augmentation Therapies Preserve Brain Network Integrity and Hemodynamics in a Canine Permanent Occlusion Model. *Nature Scientific Reports*, 14:16871.

3. **Warioba, C.S.**, Liu, M., Penano, S., Foxley, S., Christoforidis, G.A., & Carroll, T.J. (2024). Efficacy Assessment of Cerebral Perfusion Augmentation Through Functional Connectivity in an Acute Canine Stroke Model. *American Journal of Neuroradiology*, 45(9):1214–1219.
2. **Warioba, C.S.**, Jackson, L.G., Neal, M.A., & Haines, B.E. (2023). Computational Study on the Role of Zn(II) Z-Type Ligands in Facilitating Diaryl Reductive Elimination from Pt(II). *Organometallics*, 42(16):2295–2303.
1. Hunter, D.J., & **Warioba, C.S.** (2021). Segregation Surfaces. *Mathematics Magazine*, 94(3):163–173.

## Book Chapters

8. **Warioba, C.S.** (2017). Disadvantaged Demographics in a White Privileged Society: Critical Perspectives on the American Dream. In *Critical Race Theory and Social Justice in Education*. Autoethnographic Research Project.

## Conference Abstracts

4. **Warioba, C.S.**, Wang, Y., Law, C.S.W., Weber, K., & Mackey, S. (2026). Free water fraction as neuroinflammatory biomarker in chronic pain using NODDI. *International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting*, Honolulu, HI. [Digital Poster, Abstract #04949]
3. **Warioba, C.S.** (2026). Gradient Path Algebra Captures Temporal Structure Beyond B-Tensors. *International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting*, Honolulu, HI. [Digital Poster, Abstract #05016]
2. **Warioba, C.S.**, et al. (2024). Preserving Network Integrity Through Flow Augmentation in Acute Stroke. *Organization for Human Brain Mapping Annual Meeting*, Montreal, Canada. [Poster]
1. **Warioba, C.S.**, et al. (2023). Functional Connectivity Biomarkers in Hyperacute Ischemic Stroke. *International Society for Magnetic Resonance in Medicine*, Singapore. [Oral]

## Honors and Awards

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### National Awards

<b>National Science Foundation Graduate Research Fellowship</b> \$37,000 annual stipend for three years of doctoral research	2023–2025
<b>Carl B. Allendoerfer Award</b> , Mathematical Association of America National award for exceptional expository excellence in <i>Mathematics Magazine</i>	2022

### International Recognition

<b>Academic Visitor Award</b> , University of Oxford, UK Department of Clinical Neurosciences	2023–2024
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### Institutional Fellowships

T32 Training Grant, NIH/Stanford University	2025–Present
Initiative for Maximizing Student Development Fellowship, University of Chicago	2021
NSF Quantum Foundry Fellowship, UC Santa Barbara	2020

### University Awards

<b>Dave Dolan Award</b> , Westmont College Recognition for leadership in responding to social and spiritual needs of the college	2021
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## Research Experience

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### **T32 Postdoctoral Scholar**

May 2025 – Present

*Stanford University School of Medicine, Division of Pain Medicine*

PIs: Sean Mackey, MD, PhD & Kenneth Weber, DC, PhD

- Developing machine learning algorithms and deep learning models for high-dimensional neuroimaging data analysis in chronic pain studies
- Investigating brain biomarkers using multimodal MRI approaches including NODDI, DKI, and advanced diffusion techniques
- Processing and analyzing HEAL Initiative biomarker datasets (200+ subjects) to distinguish high-impact from low-impact chronic pain
- Implementing comprehensive preprocessing pipelines on Stanford's Sherlock computing cluster

### **NSF Graduate Research Fellow**

August 2023 – June 2025

*University of Chicago, Department of Radiology*

PI: Timothy J. Carroll, PhD

- Developed novel algorithms for resting-state functional connectivity analysis using group ICA
- Applied advanced statistical methods to assess resting-state network integrity (n=40)
- Implemented BOLD time-lag analysis and global mean signal processing techniques
- Created computational pipelines for cross-species translational stroke research

### **Academic Visitor**

September 2023 – August 2024

*University of Oxford, Department of Clinical Neurosciences, Oxford, UK*

- Collaborated on international neuroimaging projects focused on stroke recovery
- Developed cross-platform harmonization protocols for multi-site MRI studies
- Participated in advanced neuroimaging seminars and workshops

### **Graduate Research Assistant**

September 2021 – August 2023

*University of Chicago, Department of Radiology*

- Performed comparative analysis of x-ray and micro-CT imaging systems
- Developed image reconstruction algorithms for preclinical imaging applications
- Optimized multimodal imaging protocols for translational research

### **NSF Quantum Foundry Research Intern**

Summer 2020

*UC Santa Barbara, Department of Physics*

Mentors: Peter Dotti, David Weld, PhD

- Engaged photonic integrated circuits with atomically referenced lasers
- Developed protocols for small-scale quantum optical systems

### **Undergraduate Research Assistant**

September 2017 – June 2021

*Westmont College, Departments of Chemistry, Physics, and Mathematics*

- Applied density functional theory calculations for organometallic chemistry research
- Created novel mathematical visualization algorithms for segregation pattern analysis
- Developed smooth two-dimensional surface modeling techniques

## Grant Support

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### Current

**NIH T32 Training Grant (T32DA035165)** 2025–2028  
Role: Postdoctoral Trainee  
“Interdisciplinary Training in Pain and Substance Use Disorders”

### Completed

**NSF Graduate Research Fellowship (DGE-2140004)** 2023–2025  
Role: Principal Investigator  
Total Award: \$111,000

**Initiative for Maximizing Student Development (R25GM109439)** 2021  
Role: Graduate Fellow

## Technical Expertise

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**Programming & Software:** Python (NumPy, SciPy, Pandas, scikit-learn, PyTorch, TensorFlow), MATLAB, R, C++, JavaScript; Jupyter, Git/GitHub, Docker, HPC clusters, BIDS format

**Neuroimaging Tools:** SPM, FSL, AFNI, FreeSurfer, ANTs, BrainVoyager, MRtrix3

**Statistical & Computational Methods:** Independent Component Analysis (ICA), Principal Component Analysis (PCA), time series analysis, mixed-effects models, deep learning for medical imaging, convolutional neural networks, network analysis and graph theory, Bayesian inference and hierarchical modeling

**Imaging Modalities:** Resting-state and task-based fMRI processing, diffusion tensor imaging (DTI) and tractography, structural MRI segmentation and morphometry, magnetic resonance spectroscopy (MRS), multi-modal data integration and harmonization

## Teaching Experience

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**Graduate Teaching Assistant** September 2021 – May 2023  
*University of Chicago, Department of Radiology*

- Interactions of Ionizing Radiation with Matter (Fall 2021, Fall 2022)
- Physics of Medical Imaging II (Spring 2022, Spring 2023)
- Developed problem sets and conducted review sessions for 40+ graduate students
- Received excellent teaching evaluations (4.8/5.0 average)

## Mentoring

- Mentored 3 undergraduate students in neuroimaging research projects (2023–2025)
- Supervised 2 rotating graduate students in fMRI analysis techniques (2024)
- STEM tutor for high school students in underserved communities (2021–Present)

## Invited Talks and Presentations

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### Invited Seminars

1. “Geometric Approaches to Understanding Rotational Invariance in fMRI.” UChicago Committee on Medical Physics, UChicago, IL, July 2025.

2. “Cross-Species Translation in Stroke Research: Lessons from Canine Models.” Oxford Neuroscience Symposium, Oxford, UK, March 2024.

### Award Lectures

1. “Mathematical Visualization of Segregation Surfaces.” MAA MathFest, Philadelphia, PA, 2022. [Allendoerfer Award Lecture]

## Leadership and Service

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### Professional Service

Reviewer: *NeuroImage*, *Human Brain Mapping*, *Journal of Neuroscience Methods*

Member, Program Committee: Medical Physics Graduate Student Symposium (2023)

### Institutional Leadership

Co-President, Graduate Program of Medical Physics, University of Chicago 2023

DEI Student Liaison, Graduate Program of Medical Physics, University of Chicago 2023

President, Black Student Union, Westmont College 2020–2021

### Community Engagement

Organizer, Racial Justice and Reconciliation Discussion Panels, Westmont College (2019–2021)

Volunteer, Brain Awareness Week outreach to local schools (2022–Present)

STEM mentorship program for underrepresented minorities (2021–Present)

## Professional Development

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### Continuing Education

MITx MicroMasters in Statistics and Data Science 2025

Massachusetts Institute of Technology (via edX)

Courses: Probability, Fundamentals of Statistics, Machine Learning with Python

Introduction to Probability (STAT110x), Harvard University 2024

### Workshops and Training

Advanced fMRI Analysis Workshop, OHBM Educational Course (2024)

Machine Learning for Neuroimaging, Stanford Data Science Institute (2025)

High Energy Physics Training, SLAC National Accelerator Laboratory (2020)

## Professional Memberships

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Organization for Human Brain Mapping (OHBM) 2023–Present

International Society for Magnetic Resonance in Medicine (ISMRM) 2022–Present

Society for Neuroscience (SfN) 2025–Present

Mathematical Association of America (MAA) 2021–Present

## References

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**Sean Mackey, MD, PhD**

Redlich Professor  
Chief, Division of Pain Medicine  
Stanford University School of Medicine  
[smackey@stanford.edu](mailto:smackey@stanford.edu)

**Kenneth A. Weber II, DC, PhD**

Assistant Professor  
Department of Anesthesiology  
Stanford University School of Medicine  
[kenweber@stanford.edu](mailto:kenweber@stanford.edu)

**Timothy J. Carroll, PhD**

Professor of Radiology  
Director, Biomedical Imaging Research Institute  
University of Chicago  
[tjcarroll@uchicago.edu](mailto:tjcarroll@uchicago.edu)

**David J. Hunter, PhD**

Professor of Mathematics  
Westmont College  
[dhunter@westmont.edu](mailto:dhunter@westmont.edu)

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