OMB No. 0925-0001 and 0925-0002 (Rev. 10/2023 Approved Through 01/31/2026)

# BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key Personnel and other significant contributors.

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**NAME:**
Warioba, Chisondi S.

**eRA COMMONS USER NAME:**
CSWARIOBA

**POSITION TITLE:**
T32 Postdoctoral Scholar

**EDUCATION/TRAINING:**

| INSTITUTION AND LOCATION | DEGREE (if applicable) | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| Westmont College, Santa Barbara, CA | B.S. | 06/2021 | Chemistry |
| Westmont College, Santa Barbara, CA | B.A. | 06/2021 | Physics |
| Westmont College, Santa Barbara, CA | B.A. | 06/2021 | Biology |
| University of Chicago, Chicago, IL | Ph.D. | 06/2025 | Medical Physics |
| Stanford University, Stanford, CA | Postdoctoral | Present | Pain Medicine / Neuroimaging |

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## A. Personal Statement

I am a computational scientist and machine learning researcher with a PhD in Medical Physics and postdoctoral training at Stanford University School of Medicine. My research focuses on developing machine learning algorithms and computational methods for biomarker discovery using high-dimensional neuroimaging data. I have extensive experience building end-to-end analytical pipelines on HPC infrastructure, implementing physics-informed neural networks, and translating complex scientific problems into validated computational solutions.

My doctoral work at the University of Chicago developed cross-species translational frameworks for mapping functional connectivity alterations in stroke, resulting in publications in Nature Scientific Reports and the American Journal of Neuroradiology. As an NSF Graduate Research Fellow, I designed novel manifold alignment algorithms for multi-modal data integration and built reproducible analysis pipelines for large-scale neuroimaging studies. My mathematical work on spatial pattern analysis was recognized with the Carl B. Allendoerfer Award from the Mathematical Association of America.

Currently, as a T32 postdoctoral scholar at Stanford, I lead the computational analysis for the NIH HEAL Initiative biomarker discovery project, developing predictive models that achieve diagnostic AUC of 0.847 and prognostic AUC of 0.900 for chronic pain patient stratification. I am well-prepared to contribute to the proposed research given my expertise in machine learning, signal processing, physics-informed modeling, and cross-disciplinary collaboration with clinical and scientific teams.

## B. Positions, Scientific Appointments, and Honors

### Positions and Scientific Appointments

2025-Present T32 Postdoctoral Scholar, Stanford University School of Medicine

2023-2024 Academic Visitor, University of Oxford, Department of Clinical Neurosciences

2023-2025 NSF Graduate Research Fellow, University of Chicago

2021-2025 Graduate Research Assistant, University of Chicago, Department of Radiology

**Honors**

2025-2028 NIH T32 Training Grant, Stanford University

2023-2025 National Science Foundation Graduate Research Fellowship ($111,000)

2023-2024 Academic Visitor Award, University of Oxford

2022 Carl B. Allendoerfer Award, Mathematical Association of America (National Award)

2021 Summa Cum Laude, Westmont College

2021 Dave Dolan Award, Westmont College

2020 NSF Quantum Foundry Fellowship, UC Santa Barbara

## C. Contributions to Science

**1. Machine Learning for Biomarker Discovery in Neuroimaging**

My current research at Stanford focuses on developing machine learning algorithms for biomarker discovery using high-dimensional neuroimaging data. As part of the NIH HEAL Initiative, I have built predictive models integrating diffusion MRI features (DTI, DKI, NODDI) with clinical data to stratify chronic pain patients. These XGBoost-based classifiers achieve diagnostic AUC of 0.847 and prognostic AUC of 0.900 across datasets of 200+ subjects. I developed end-to-end pipelines on HPC infrastructure processing 154+ subjects with 94.6% usable data yield, demonstrating the translation of ML methods into production-quality research tools.

**2. Cross-Species Translational Neuroimaging and Computational Modeling**

My doctoral research developed novel computational frameworks for cross-species translation of neuroimaging biomarkers. I created manifold alignment algorithms that map functional connectivity patterns between canine and human brains, enabling the translation of stroke research findings across species. This work demonstrated that flow augmentation therapies preserve brain network integrity under acute stroke conditions, with implications for therapeutic development. These contributions were published in Nature Scientific Reports and the American Journal of Neuroradiology. [See Products 1-2]

**3. Mathematical Modeling and Signal Processing for Imaging Science**

I have developed mathematical frameworks for understanding signal processing in neuroimaging, including geometric approaches to rotational invariance in fMRI connectivity analysis. My work applies physics-informed neural networks integrating biophysical models with deep learning for quantitative biomarker extraction. Earlier mathematical work on segregation pattern visualization was recognized with the Carl B. Allendoerfer Award from the Mathematical Association of America, demonstrating my ability to develop novel mathematical methods with real-world applications. [See Products 3-4]

**4. Computational Chemistry and Interdisciplinary Scientific Computing**

My undergraduate research applied density functional theory calculations to understand mechanisms in organometallic chemistry, specifically the role of Zn(II) Z-type ligands in facilitating reductive elimination from Pt(II) complexes. This work, published in Organometallics, demonstrates my ability to apply computational methods across scientific domains and my foundation in chemistry and physics that informs my current biophysical modeling work. [See Product 5]

## D. Products

**Products Most Closely Related to the Proposed Project:**


1. 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.

2. 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.

3. 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.

4. 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., 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.


**Other Significant Products:**

6. Warioba, C.S. (2025). Coloring Outside the Lines: A Mathematical Adventure in Segregation Mapping. Math Horizons, DOI: 10.1080/10724117.2025.2541583.

7. Hunter, D.J., & Warioba, C.S. (2021). Segregation Surfaces. Mathematics Magazine, 94(3):163-173. [Carl B. Allendoerfer Award Winner]

Complete List of Published Work: [ORCID iD or My Bibliography URL to be added]