

EBENEZER AMARE - Aspiring Physician-Scientist pursuing regenerative medicine and global health equity

yoseph@unc.edu

ebenezeramare.com

571-635-2546

EDUCATION

University of North Carolina – Chapel Hill (Joint BME with NC State)

Aug 2023 – May 2027

Bachelor of Science in Biomedical Engineering (BME) and Neuroscience; Minor in Chemistry GPA: 3.740

Specializations – Regenerative Medicine and Medical Microdevices MCAT: 523 (99th percentile)

Relevant Coursework – Writing in Medicine, Mechatronics, Materials Science, Biomedical Electronics, Biological Physics, Cellular Biology, Molecular Genetics, Human Physiology: Mechanical and Electrical Analysis, Systems and Signals, Bioinstrumentation, Tissue Engineering Technologies, Public Speaking

HONORS & AWARDS

NAE Grand Challenges Scholar – National engineer development program with focus in Engineering Better Medicines

BME Department Scholarship – Inaugural annual BME Department grant for anonymously nominated students

Jackie Overton Carolina Scholar - UNC alumni grant for financially insecure and academically excelling students

Abrams Scholars – UNC-funded BME award for research in transcriptional regulators of intestinal stem cells

NC Fellows – Community-centered leadership development program with Junior summer research stipend

Honors Carolina – Highly selective academic program with priority access to Honors classes, seminars, and resources

Ron Brown Captains Program – Top 5% of applicants; member of the Ruth-Norman Rales Leader Network

National Pan-Hellenic Council – Nominated for and won one of two Black Scholar awards for high school seniors

PUBLICATION

Burclaff J, Breau K, Chi L, DeLoach W, **Amare E**, Cooper L, Walcott V, Hinesley C, Dixit M, Chen K, Meyer M, Sweet C, Walker D, Bliton J, Tang C, Magness ST. SOX9-mediated G1 elongation confers reserve stem cell-associated injury resistance in human intestinal stem cells. [Preprint; under submission, 2026].

RESEARCH EXPERIENCE

UNC Center for Gastrointestinal Biology and Disease - Chapel Hill, NC

Oct 2024 – Present

Abrams Research Scholar/ Magness Lab

- ♦ **Honors Thesis (BMME 691H & 692H):** Engineering a transwell intestinal epithelial culture system with an integrated phosphorescence-based photonic biosensor (iPOB) to establish and quantify real-time oxygen gradients, induce “differentiation zones” using basal media with stem cell factors, and characterize organoid hypoxic niche dynamics, with applications to IBD pathophysiology and therapeutic screening.
- ♦ **Publication contributions:** Co-authored (5th of 16) the SOX9 G1-elongation study above, contributing across the wet-lab pipeline: assisted in genetically engineering a dual-gene inducible INK4A construct in wild-type and SOX9-knockout ISC backgrounds via electroporation; cultured, passaged, and drug-treated primary human ISC monolayers and 3D organoids through Palbociclib G1-arrest and 5-Fluorouracil chemotoxicity assays; and quantified organoid survival, EdU incorporation, and organoid-formation efficiency via immunofluorescence staining and ImageJ analysis across wild-type, SOX9-KO, SOX9-OE, and rescue lines.
- ♦ **Abrams Scholar project:** Investigated how transcription factor SOX9 regulates ISC metabolism by engineering lines that overexpress candidate downstream TFs (EGR1, HNF4G) and integrating Mito-TagRFP into four lines (wild-type, SOX9-KO, SOX9-OE, SOX9-KOOE) for live-cell mitochondrial imaging, validated by staining and antibiotic selection. Optimized a Seahorse bioenergetics platform w/ CyQUANT normalization and ran Mito Stress Test assays across all four lines; found that SOX9 loss elevates respiratory and glycolytic activity while knockout-background reintroduction suppresses both, and that EGR1 overexpression represses glycolytic flux, supporting EGR1 as a downstream effector of SOX9 metabolic control; authored lab SOPs for organoid plating, Flex Plate assays, and CyQUANT normalization; presented at the **BME and CGIBD Annual Symposia**.

SensUs Competition Team – Raleigh, NC and Eindhoven, Netherlands

Nov 2025 – Aug 2026

BioInterface Lab

- ♦ Designed a continuous, non-enzymatic levodopa OECT (organic electrochemical transistor) biosensor with a triple-gate architecture – a boronic acid polymer, a cationic polymer, and a novel dual-recognition polymer – for Parkinson's disease management – and presented at the **SensUs 2026 International Competition** in Eindhoven.
- ♦ Led end-to-end recognition chemistry: synthesized functional acrylamide copolymers (boronic-acid, cationic, and dual-recognition) via free-radical polymerization; characterized by proton NMR and a full electrochemical pipeline (CV, DPV, OCP, EIS); characterized PEDOT:PSS OECTs via transfer/output curves (Keithley 2602B SMU) with Python-based transconductance extraction.

EBENEZER AMARE - Aspiring Physician-Scientist pursuing regenerative medicine and global health equity

yoseph@unc.edu

ebenezeramare.com

571-635-2546

- ◆ Designed a multivariate signal deconvolution approach to resolve levodopa from interferents (dopamine, carbidopa); conducted stakeholder discovery across neurology, geriatrics, pharma, and patients; developed a regulatory pathway, reimbursement framework, and B2B model proposing an IDE-supported data-sales-to-licensing pathway for the Translation Potential award.

Center for Environmental Medicine, Asthma and Lung Biology –Chapel Hill, NC

Aug 2024 – Oct 2024

Work Study/ Jaspers Lab

- ◆ Performed demographic stratification and time-based analysis of a 750-patient, 26-year respiratory dataset in R Studio assessing correlation between global warming and allergy severity; designed and 3D-printed a breathable-resin 12-well plate in OnShape for respiratory research.

National Institutes of Health –Rockville, MD

May 2024 – Aug 2024

National Center for Advancing Translational Sciences/ Stem Cell Translation Laboratory/ Summer Research Intern [SIP]

- ◆ Researched mechanisms of chronic pain [HEAL Initiative] with Dr. David Castellano in the premier NIH Stem Cell Lab by learning and optimizing hPSC-derived sensory neuron differentiation (improving differentiation efficiency while maintaining cell viability) while assisting with MEA and patch-clamp EEG recordings.
- ◆ Validated high-value proteins from mass spectrometry using a machine learning pain genes database and characterized proteins up/downregulated in response to a 4-part inflammatory cocktail – particularly plasma membrane receptor DCC, which binds to netrin-1, an axonal guidance molecule, and is critical for axonal elongation, which has previously been shown to cause inflammatory sensitization in mice - using Western Blot and Immunocytochemistry; lastly, I mined DCC's downstream signaling pathways and proposed inflammatory pathways that were utilized in an August grant application. Presented at **NIH Summer Poster Day**.
- ◆ Completed coursework in Preclinical Translational Science and in RStudio for Multi-Omics Analysis

RESEARCH & TECHNICAL PROJECTS

BMME 697, 698, & 581: Senior BME Design Lab I & II and Six-Sigma Belt

Aug 2026 – May 2027

- ◆ Leading a team in engineering a biosensor for real-time monitoring of molecules released by proximal tubule kidney cells for use in an implantable bioartificial kidney device, building on the BMME 298/398 CAD.
- ◆ Developing process optimization strategies incorporating Six-Sigma quality control protocols and FDA cGMP (current Good Manufacturing Practice) guidelines for therapeutic cell production with focus on reproducibility and regulatory compliance, gaining certification in Green/Black Six-Sigma Belt and proficiency in ISO 13485, EU MDR 2017/745, and ISO 22716.

BMME 298 & 398: Sophomore and Junior BME Design Lab

Jan 2025 – May 2026

- ◆ Designed an implantable bioartificial kidney CAD model that could incorporate proximal tubule cells in biocompatible housing for chronic kidney disease treatment, integrating microfluidic and waste filtration systems; later used in BMME 698.
- ◆ Gained proficiency in PCB design through mini-projects that employed Autodesk Fusion 360, 3D printing, wiring, and tig welding, and built a peristaltic pump using laser cutting, metal cutting, CNC milling, lathes, drill machines, and tubing.

BMME 511: Genetic Engineering

Jan 2026 – May 2026

- ◆ Learned CRISPR techniques and wrote a complete NIH F31 Predoctoral Fellowship grant proposal: CRISPRa-Mediated Metabolic Stabilization of Directly Differentiated iPSC-Derived Proximal Tubule Cells for Bioartificial Kidney Devices

BMME 575 & COMP 116: ML for Biosignal Analysis & Intro to Python – Chapel Hill, NC

Aug 2025 – Dec 2025

- ◆ Built CNN/RNN deep learning models for biosignal classification and feature extraction for wearable diagnostics; applied Python pipelines for data processing and image classification

NSCI 278: Molecular Brain Imaging – Chapel Hill, NC Jan 2026 – May 2026

- ◆ Investigated sex differences in VGLUT2/DBH co-expression in A1 noradrenergic neurons using double immunofluorescence labeling in transgenic eGFP-reporter mice, quantifying fluorescence intensity across male and female cohorts via ImageJ mask-based analysis. Presented findings at the **2026 UNC OUR Celebration of Undergraduate Research Symposium**.

CHEM 262L: Organic Chemistry Laboratory II – Chapel Hill, NC

Jan 2026 – May 2026

- ◆ Synthesized an unsymmetrical triarylpyrylium photoredox catalyst via parallel aldol condensation/acid-catalyzed cyclization routes through distinct chalcone intermediates; characterized via ¹H NMR, UV-visible and fluorescence spectroscopy, and cyclic voltammetry to determine excited-state reduction potential ($E^*_{1/2} = +2.50$ V vs. SCE) using the Rehm-Weller equation, then validated thermodynamic feasibility by driving visible-light-mediated oxidation of 1-phenylethanol to acetophenone

EBENEZER AMARE - Aspiring Physician-Scientist pursuing regenerative medicine and global health equity

yoseph@unc.edu

ebenezeramare.com

571-635-2546

EDUC 318, 317 & 309: Education Policy Research & Data Analysis — Chapel Hill, NC

an 2025 – May 2025

- ◆ Conducted statewide longitudinal analysis of NC public school data (2014–2024) examining the causal effect of STEM designation on socioeconomic achievement gaps across 2,396 schools w/ difference-in-differences, multilevel modeling, and causal forest methods
- ◆ Identified statistically significant gap reduction of 0.30 standard deviations in high-poverty schools ($EDS \geq 60\%$) following STEM designation as a structural equity policy failure, among other findings
- ◆ Presented research findings to NC Fellows leadership and developed actionable policy recommendations for STEM designation reform targeting high-poverty districts including Greene, Rowan-Salisbury, and Gaston counties

CLINICAL EXPERIENCE

Student Health Action Coalition – Carrboro, NC

Aug 2025 – Present

Spanish Translator

- ◆ Serve as a Spanish medical interpreter in SHAC's free community clinic — supporting check-ins, escorting patients, gathering histories and symptoms, and assisting medical students with treatment and medication instructions to facilitate culturally competent, accessible care

CareYaya – Research Triangle, NC

Aug 2024 – Present

Patient Care Technician

- ◆ Provide hands-on care to elderly and neurodegenerative patients - mobility support, adjustments to prevent ulcers, safe transfers, and PT/OT exercises - while facilitating cognitive engagement and preserving patient dignity
- ◆ Advocated for patients to receive medication and necessary attention in understaffed caretaking homes

Minority Association for Premedical Students: Shadowing Program – Chapel Hill, NC

Sep 2025 – Present

Program Founder and Director (16 personal shadowing hours)

- ◆ Founded UNC MAPS' first structured shadowing program to increase access for underrepresented premedical students through building partnerships with UNC Pediatrics and SNMA to secure mentors and clinical placement
- ◆ Managed applications, scheduling, and onboarding while developing standardized program policies
- ◆ Shadowed pediatricians in clinic under Drs. Katherine Jordan, Rebecca Chasnovitz, and Sandeep Dhadvai, learning complex care and assisting with Spanish translation where possible

UNC Kidney Center – Chapel Hill, NC

Jun 2025 – Sep 2025

North Carolina Kidney Technology Incubator (NC-KTI) Program (15 shadowing hours)

- ◆ Inspired by my mother (a dialysis nurse), engaged in "Kidney Conversations" with nephrologists on kidney biology, treatment gaps, and equitable care access; shadowed kidney transplants and vascular access surgery with Dr. Saad Shariff; initiated and led a student team developing a kidney-focused educational tool, producing a conceptual model and conducting validation studies on its educational merit

Children's National Hospital – Washington, DC

May 2024 – Jun 2024

Department of Pain Medicine and Anesthesiology Observership (24 shadowing hours)

- ◆ Shadowed cardiac pediatric anesthesiologists across urology, neurosurgery, ENT, general, and cardiac surgery; attended attending lectures (Drs. Andrew Waberski, Jeremy Deer); gained hands-on exposure to procedures from biopsies to cranioplasties

UNC Hospitals Ambulatory Care Center – Chapel Hill, NC

Apr 2025 – Dec 2025

Neurosurgery Clinic (12 shadowing hours)

- ◆ Shadowed neurosurgeons across diagnosis, imaging review, and post-operative follow-up; observed the OR and studied approaches to patient interaction with Dr. Upadhyaya, and balancing surgery with research through Drs. Vibhor Krishna and Dominique Higgins

POSTERS & PRESENTATIONS

SensUs International Competition – Eindhoven, Netherlands

Aug 2026

Presentation and Poster: *Continuous Non-Enzymatic Levodopa Sensing via Triple-Gate OECT Biosensor for Parkinson's Disease Management*

- Also presented at NC State's Summer Research Symposium, PackaPalooza (NCSU ECE Department), and the Grand Challenge Scholars Program Research Symposium

EBENEZER AMARE - Aspiring Physician-Scientist pursuing regenerative medicine and global health equity

yoseph@unc.edu

ebenezeramare.com

571-635-2546

Center for Gastrointestinal Biology & Disease (CGIBD) Scientific Symposium – Research Triangle, NC June 2026
Poster: *Characterizing Novel Transcriptional Regulators of Mitochondria in Human Intestinal Stem Cells*

Lampe Joint Biomedical Engineering (BME) Poster Symposium – Durham, NC April 2025
Poster: *Identifying Novel Transcriptional Regulators of Mitochondria in Human Intestinal Stem Cells*

National Institutes of Health (NIH) Summer Poster Day – Bethesda, MD June 2024
Poster: *Characterization of Netrin-1 Receptor DCC in Human Pluripotent Stem Cell-Derived Sensory Neurons During Inflammatory Sensitization*

TJ Science and Technology Research (STAR) Symposium – Alexandria, VA May 2022
Presentation: *Optimization of Durability and Biodegradability of C. Vulgaris Starch-Based Bioplastic*

LEADERSHIP & COMMUNITY INVOLVEMENT

Minority Association for Premedical Student: UNC Chapter – Chapel Hill, NC May 2024 – Present
President & former SNMA (Students National Medical Association) Liaison

- ◆ Oversee MAPS alongside Favor Asbore — improving membership, expanding pre-health pathways, and coordinating partnerships (National Marrow Donor Program, Kaplan, Stop the Bleed) alongside joint MAPS-SNMA mentorship events, workshops, and medical school tours
- ◆ Worked 2 years with physicians, med students, and co-SNMA liaisons to establish MAPS' inaugural shadowing program in a variety of Pediatric subspecialties for low-income, underrepresented students with no prior exposure. We have facilitated 400+ shadowing hours for 25 students collectively in our first and second cohorts.

STEM and Premedical Mentorship Programs – Various Counties, NC Dec 2025 – Present
Mentor and Curriculum Developer; Founding Member

- ◆ Co-founding an OUR-supported UNC lab shadowing program with four other founding members, spanning the Psychology/Neuroscience, Cancer Research, and Toxicology programs
- ◆ Established InnovaXcell's first cohort of 28 students weekly at Phoenix Academy (alternative) High School to increase early access to research for underrepresented minority and low-income NC students

North Carolina Fellows – Chapel Hill, NC Apr 2024 - Present
Admissions Committee

- ◆ Completed a capstone on equity gaps in access to shadowing, research, and mentorship; reviewed applications for the 2028–30 NC Fellows cohorts; helped initialize the East African Student Org (EASO) Executive Board

Helping Hand Project – Chapel Hill, NC Aug 2023 – Feb 2025
Innovation Team and Design Team

- ◆ CAD-designed and 3D-printed custom prosthetic arms/hands for low-income recipients; built an autonomous prosthetic model in OpenSCAD

SKILLS & CERTIFICATIONS

Languages: Amharic (heritage), Spanish (medical interpretation)

Computational & Design: Python, MATLAB, R Studio, Java, Arduino (C/C++); ODE modeling, deep learning (CNN/RNN; conceptual), multi-omics analysis, causal inference; 3D CAD (OnShape, AutoCAD, OpenSCAD), 3D printing, laser cutting; ArcGIS, Jupyter, Excel

Translation & Regulatory: Stakeholder discovery, FDA regulatory pathways (IDE/De Novo), Medicare/Medicaid reimbursement modeling, cGMP/ISO quality systems, grant writing (NIH F31), scientific and business pitching

Wet Lab & Cell Biology: Primary organoid/cell culture & passaging, hPSC differentiation, genetic engineering (electroporation, inducible/knockout lines), Seahorse bioenergetics, live-cell & immunofluorescence imaging, ImageJ quantification, Western blot, ICC, ELISA, gel electrophoresis, MEA

Certifications: NIH Principles of Preclinical Translational Science, NIH Fundamentals of Omics Data Analysis; Green/Black Six-Sigma Belt; NCMW Mental Health First Aid; AHA Basic Life Support