

# Graham Cole Goforth

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## EDUCATION

### The University of Tennessee, Knoxville

Knoxville, Tennessee

*B.S. in Honors Biochemistry and Cellular/Molecular Biology (GPA: 3.93/4.0)*

Expected May 2026

- **Thesis:** “Optimization of Lipid Nanoparticles for Stability, Cytotoxicity, and Uptake by Varying Phospholipids”
- **PI:** Dr. Deidra Mountain
- Chancellor’s Honors Scholar

### Vanderbilt University

Nashville, Tennessee

*Ph.D. in Biological Sciences*

Planned Start August 2026

## TECHNICAL AND LABORATORY SKILLS

### Molecular Biology

SDS-Page; Agarose Gel Electrophoresis; DNA and Plasmid Isolation; Polymerase Chain Reaction (PCR); Isothermal Titration Calorimetry (ITC); Matrix-Assisted Laser Desorption/Adsorption Ionization-Time of Flight (MALDI-TOF); Circular Dichroism; Differential/Gradient Centrifugation

### Cellular Biology

Mammalian and bacterial cell culturing (BL21[DE3], HASMC); Fluorescence Microscopy; Biosafety Level 2 (BSL-2); Colony Transformation/Inoculation/Isolation

### Analytical Chemistry

Gas Chromatography-Mass Spectroscopy; Cyclic Voltammetry (AFCBP1 Bipotentiostat); High-Performance Liquid Chromatography (HPLC; Buck BLC-10); Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES)

### Nanochemistry

Lipid Nanoparticle (LNP) Synthesis; Drug Delivery (Entrapment and Release profiles); Dynamic Light Scattering (DLS); Polydispersity Index (PDI) Analysis

### Instrumentation

UV-Vis Spectrophotometer (Agilent Cary 100); ThermoFisher NanoDrop Microvolume Spectrophotometer; Nuclear Magnetic Resonance Spectrophotometer ( $^1\text{H}$ -NMR); Fourier-Transforming Infrared Spectrophotometer (FT-IR)

## RESEARCH EXPERIENCE

### Vascular Research Laboratory, University of Tennessee Graduate School of Medicine

Knoxville, TN

*Undergraduate Researcher (PI: Dr. Deidra Mountain)*

June 2025 – Present

- Synthesized lipid nanoparticles with varying concentrations of 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE) as a substitute for conventional helper lipids to evaluate the impact of phospholipid choice on nanoparticle performance by analysis of encapsulation efficiency
- Performed DLS and PDI analysis to evaluate nanoparticle homogeneity, size stability, and reproducibility
- Conducted in vitro cytotoxicity assays to determine biocompatibility across different LNP formulations, with attention to lipid-dependent effects on cell viability
- Quantified cellular uptake of fluorescently labeled LNPs, analyzing the contribution of DOPE’s fuseogenic, cone-shaped geometry in facilitating endosomal escape relative to DSPC’s stabilizing cylindrical structure
- Reviewed structural-functional relationships of LNP components (ionizable lipids, cholesterol, PEG-lipids, and helper phospholipids) in RNA delivery systems relevant to vaccines and gene therapies

### Molecular Oncology Literature Analysis, Department of Biochemistry

Knoxville, TN

*Undergraduate Study (Mentor: Dr. Jacob Sanders)*

May 2025 – August 2025

- Conducted a systematic literature analysis of natural product-derived cancer therapeutics, focusing on the flavonoid *wogonoside* from *Scutellaria baicalensis* and its derivatives

- Evaluated preclinical studies demonstrating wogonoside's suppression of tumor angiogenesis and metastatic signaling through Hedgehog and Wnt/ $\beta$ -catenin pathways, VEGF downregulation, and Smoothed receptor degradation

**Dr. Michael Best Organic Synthesis Lab**, Department of Chemistry

Knoxville, TN

*Research Assistant (PI: Dr. Jinchao Lou)*

May 2024 – July 2024

- Conducted structure-function-focused synthesis of lipid-based biomolecules under Dr. Jinchao Lou, supporting research in drug delivery and lipid-probe development
- Designed and executed multi-step organic syntheses under inert atmospheres, employing techniques such as Schlenk line operation, acid-base extraction, flash column chromatography, thin-layer chromatography, and fractional crystallization
- Characterized and validated products using  $^1\text{H}$ -NMR, FT-IR, UV-Vis, and GC-MS, correlating spectroscopic data to structural integrity and purity

**Dr. Michael McKinney Lab**, Department of Ecological and Evolutionary Biology

Knoxville, TN

*Research Assistant (PI: Dr. Benjamin Keck)*

August 2022 – May 2023

- Surveyed local streams and rivers to collect data on fish species for the Etnier Ichthyological Collection

## TEACHING EXPERIENCE

**Department of Biochemistry and Cellular/Molecular Biology**

Knoxville, TN

*Undergraduate Teaching Assistant*, Cellular and Comparative Biology Lab

August 2025 – Present

- Supported the course instructor (Dr. Olena Korotych) by assisting students during advanced lab modules, including protein purification, plasmid DNA isolation, PCR, restriction digests, and gel electrophoresis
- Aided in the demonstrations and data collection using research instrumentation involving UV-Vis, mass photometry, MALDI-TOF, ITC, and circular dichroism

**Department of Biology**

Knoxville, TN

*Undergraduate Teaching Assistant*, Introduction to Biological Investigation Lab

January 2023 – May 2023

- Prepared reagents and experimental materials, ensuring accuracy and readiness for weekly laboratory experiments
- Instructed students in core biological techniques, including sterile inoculation, microscopy, and data collection
- Reinforced best practices in biosafety, experimental design, and record-keeping to promote reproducibility

## WORK EXPERIENCE

**Department of University Housing**; The University of Tennessee, Knoxville

Knoxville, TN

*Resident Assistant*

August 2023 – Present

- Built inclusive residential communities by implementing the Community Development Model, fostering academic success, cultural awareness, and well-being amongst 36 assigned residents
- Promoted diversity and belonging through programming, encouraging reflection on values, ethics, and identity
- Managed administrative responsibilities including occupancy reports, health and safety inspections, incident reports, and emergency drills with accuracy and timeliness

**Dollywood's Splash Country Waterpark**

Pigeon Forge, TN

*Operations Team Lead*

June 2020 – Present

- Supervise and coordinate daily operations for a staff of 275+ employees, ensuring optimal scheduling, staffing coverage, and compliance with safety and operational standards
- Maintain detailed records of training certifications, incident reports, and compliance documentation to meet OSHA and company regulatory requirements
- Assist in annual recruitment, onboarding, and licensing of both new and returning staff, contributing to workforce development and organizational efficiency
- Serve as division lead during operating hours, resolving guest concerns with professionalism and directing the implementation of emergency action plans as primary first responder

## EXTRACURRICULAR LEADERSHIP EXPERIENCE

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### University Traffic and Parking Authority

Knoxville, TN

*Undergraduate Member*

August 2024 – Present

- Contributed to the development of campus transportation policies balancing safety, accessibility, and regulatory compliance

### Student Conduct and Community Standards Review Board

Knoxville, TN

*Undergraduate Member*

January 2024 – Present

- Upheld ethical standards and procedural fairness by evaluating evidence, applying university policy, and determining appropriate sanctions in student conduct cases alongside peers

### Magnolia and Dogwood Residence Hall Association

Knoxville, TN

*President*

August 2022 – May 2023

- Directed executive board operations and managed an \$8,500 budget to implement programs fostering leadership, community, and inclusion within the residence halls

## PRESENTATIONS

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### “Optimization of Lipid Nanoparticles for Stability, Cytotoxicity, and Uptake”

Knoxville, TN

*Exhibition of Undergraduate Research and Creative Achievement (EURēCA)*

Tentative April 2026

### “Optimization of Lipid Nanoparticles for Stability, Cytotoxicity, and Uptake”

Knoxville, TN

*Arts and Sciences Undergraduate Research Symposium (ASUReS)*

Tentative March 2026

### “Perceived Academic Stereotypes vs. Performance”

Knoxville, TN

*Exhibition of Undergraduate Research and Creative Achievement (EURēCA)*

June 2023

- This study evaluated perceived stereotypes across undergraduate programs compared to academic performance. Data obtained from the university registrar revealed no significant GPA differences, challenging these stereotypes and warranting further investigation.

## MEMBERSHIPS AND AFFILIATIONS

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**Phi Beta Kappa**, *University of Tennessee Chapter*

March 2025 - Present

**American Chemical Society**, *University of Tennessee Chapter*

November 2023 - Present

## CERTIFICATIONS

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**Group 4 Human Subjects Research and Ethics**, *CITI Program*

June 2025-2030

**OSHA 30-Hour General Industry**, *United States Dept. of Labor*

December 2024-2029

**Notary Public**, *State of Tennessee in Hamblen County*

September 2023-2027

## HONORS & AWARDS

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**Advanced Undergraduate Research Award**, *Office of Undergrad. Research*

Date Awarded: January 2026

**The UT Beacon**, *University Housing*

Date Awarded: May 2025

**University Hall Council Member of the Year**

Date Awarded: April 2023

**The Dollywood Company’s Blue Ribbon for Safety**

Date Awarded: August 2022

**Distinguished Tennessean Four Year Scholarship**

Date Awarded: February 2022