COLE RUOFF

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Education

The University of Texas MD Anderson Cancer Center UTHealth Houston August 2024
Graduate School of Biomedical Sciences (GSBS) – Present
Houston, Texas

- Doctor of Philosophy - PhD in Quantitative Sciences and Cancer Biology

University of Maryland August 2018 – May
College Park, Maryland 2022

- Bachelor of Science - B.S. in Computer Science

Research Experience

Graduate Research Assistant May 2025 – Present
MD Anderson Cancer Center
Advisor: Nicholas Navin

- Investigated tumor evolution, therapy resistance, and metastasis in breast and prostate cancer via single-cell RNA and DNA sequencing data
- Collaborated with clinicians to coordinate tumor specimen collection for clinical studies
- Processed prostate and lymph node cancer biopsies to single cell suspensions and prepared for sequencing

Rotation Student January 2025 – April
MD Anderson Cancer Center 2025
Advisor: Loukia Karacosta

- Analyzed single-cell proteomics data to study treatment responses in small-cell lung cancer
- Processed blood liquid biopsies and prepared samples for cytometry by time-of-flight (CyTOF)
- Co-first authored manuscript detailing findings in proteomics data

Post-baccalaureate Fellow June 2022 – August
National Institutes of Health 2024
Advisor: Sridhar Hannenhalli

- Analyzed single-cell RNA sequencing data to identify non-genetic mechanisms of therapeutic resistance in various cancer cell lines
- Identified malignant cell states harboring resistance mechanisms in early drug response data
- Developed computational biology skills and familiarized myself with various bioinformatics tools through conducting research for individual project
- Drafted and compiled first-author research article detailing the findings of my research
- Presented individual research at multiple conferences and poster sessions

Research Intern February 2021 – June
National Institutes of Health 2022
Advisor: Sridhar Hannenhalli

- Developed a machine learning approach to identifying the presence of a target cell type in low resolution spatial transcriptomics data
- Consulted and collaborated with multiple immunology laboratories to identify T cell functional activity in cancer microenvironment spatial transcriptomics data
- Implemented an unsupervised breadth-first expansion algorithm relying on coexpression of genes to identify novel cell states in single-cell RNA sequencing data

Research Assistant May 2020 – August 2020
University of Maryland
Advisor: Brantley Hall

- Executed high-performance computing jobs with sequencing data from genomes of microorganisms from the human microbiome
- Developed Python scripts to analyze and annotate sequencing data (e.g. promoter discovery, motif identification, etc.)

Undergraduate Researcher January 2019 – December 2020
University of Maryland
Advisor: Catherine Spirito

- Led a research team to develop a biosensor that can detect trace amount of microRNA biomarkers for cancer
- Performed experimental procedures including PCR, Gel electrophoresis, DNA/RNA purification and quantification

Publications

1. Wang, K., Taslic, C. A., de Groot, P., Parma, M. A., Paula, A. G., Caranto, M., Shah, K., Bose, M., **Ruoff, C.,** Karacosta, L. G., Byers, L. A., Gay, C. M., Zhang, J., Heymach, J. V., & Zhang, B. (2025). First report of response to tarlatamab in a patient with histologic transformed small cell carcinoma from Alk-rearranged non-small cell lung cancer: Case report. *JTO Clinical and Research Reports*, 100941. https://doi.org/10.1016/j.jtocrr.2025.100941
2. **Ruoff, C.,** Mitchell, A., Mondal, P., Gopalan, V., Singh, A., Gottesman, M., & Hannenhalli, S. (2025). Resistance signatures manifested in early drug response across cancer types and species. *Cancer Drug Resistance*. https://doi.org/10.20517/cdr.2025.112

Presentations

1. **Ruoff C**, Bose M, Stewart A, Byers L, F Lujan E, Ehsan E, Karacosta L (05/2025). *Phenotyping circulating tumor cells in small-cell lung cancer liquid biopsies via mass cytometry.* **Cancer Systems Imaging Department Retreat.** Poster
2. **Ruoff C**, Bose M, Stewart A, Byers L, F Lujan E, Ehsan E, Karacosta L (04/2025). *Phenotyping circulating tumor cells in small-cell lung cancer liquid biopsies via mass cytometry.* **Quantitative Sciences Program Retreat.** Poster
3. **Ruoff C**, Wang J, Lin Y, Navin N (12/2024). *Investigating Drug Resistance in Triple-Negative Breast Cancer Using Single-cell DNA and RNA Data.* **Genetics & Epigenetics Rotation Blitz**, Seminar
4. **Ruoff C**, Gopalan V, Hannenhalli S (05/2023). *Transcriptional Characterization of Drug-Resistant Cancer Cells*. **Center for Cancer Research Fellows and Young Investigators Colloquium**, National Cancer Institute, Rockville, MD. Poster
5. **Ruoff C**, Gopalan V, Hannenhalli S (12/2022). *Transcriptional Characterization of Drug-Resistant Cancer Cells*. **National Cancer Institute Cancer Data Science Laboratory Seminar Series**, National Institutes of Health, Bethesda, MD. Seminar
6. **Ruoff C**, Gopalan V, Hannenhalli S (04/2022). *Combinatorial Approach to Detecting Emerging Rare Cell States in Tumors*. **University of Maryland Undergraduate Research Day**, University of Maryland, College Park, MD. Poster
7. **Ruoff C**, Gopalan V, Hannenhalli S (08/2021). *Delineating Cellular Composition in Spatial Transcriptomic Data*. **National Institutes of Health Summer Research**

Presentation Week, National Institutes of Health, Bethesda, MD. Poster

8. **Ruoff C**, Ternovskaia C, Wirt E (11/2019). *DNA-Based Biosensor for MicroRNA Detection*. **University of Maryland First-year Innovation & Research Experience Summit**, University of Maryland, College Park, MD. Poster
9. **Ruoff C,** Wirt E, Barry L, Cao V, Goodson J, Winkler W, Spirito C (10/2019). *Aptamer Selection Against Mutant Bacterial Antiterminator Protein NasR R340K*. **University of Maryland, Baltimore County Undergraduate Research Symposium**, University of Maryland Baltimore County, Baltimore, MD. Poster

Leadership Activities

Quantitative Sciences Steering Committee Student Representative August 2025 - Present
GSBS

Quantitative Sciences Student Council Member May 2025 - Present
GSBS

Genetics & Epigenetics Data Science Working Group Committee March 2025 - Present
GSBS

Teaching & Mentoring

Gulf Coast Consortium Fellows Program October 2025 - Present

- Served as a mentor to undergraduate students in the Gulf Coast Consortium Scholars Program
- Provided feedback and guidance on the graduate school application process

Graduate Student Association Peer Mentor September 2025 – Present

- Assisted first-year students in navigating the Texas Medical Center
- Answered general questions from first-year students involving graduate school milestones

University of Maryland FIRE Program Peer Mentor January 2020 – December 2020

- Trained new laboratory students in technical skills including pipette usage, PCR, gel electrophoresis, DNA/RNA purification and quantification, etc.
- Instructed students on general biology knowledge along with concepts involving aptamers, biosensors, and sequencing

Awards

National Cancer Institute's Cancer Research Training Award June 2022

GSBS Endowment Scholarship December 2025