Ariel Mundo

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Employment

University of Arkansas

Graduate Research Assistant (University of Arkansas, Fayetteville, AR) 2017-Present

> Conducting biomedical research in oncology in animal models using optics and molecular biology
> Technical writing of academic papers, conference presentations, and student mentoring

Universidad Rafael Landivar

Teaching Assistant Professor 2016-2017

> Professor of Chemistry at the Environmental and Agricultural Sciences Department
> Prepared lectures, supervised labs, mentored students, wrote lab manuals

Adjunct Professor 2013-2017

> Taught Introductory Chemistry in the Engineering, Environmental and Agricultural, and Health Sciences Departments

Lacteos Balcanicos Glad

Assistant Plant Engineer 2012

> In charge of the production of the main product (yogurt, $\approx$ 3000 L per week)

Education

University of Arkansas, PhD. Biomedical Engineering Expected 2022

Universidad Rafael Landivar (Guatemala), B.S. Chemical Engineering (cum laude) 2009

Publications

JOURNAL ARTICLES

Mundo, Ariel I., John R. Tipton, and Timothy J. Muldoon. "Using generalized additive models to analyze biomedical non-linear longitudinal data." *bioRxiv* (2021). https://doi.org/10.1101/2021.06.10.447970 (This preprint has been accepted with revisions in *Statistics in Medicine*)

Mundo, Ariel I., Gage J. Greening, Michael J. Fahr, Lawrence N. Hale, Elizabeth A. Bullard, Narasimhan Rajaram, and Timothy J. Muldoon. "Diffuse reflectance spectroscopy to monitor murine colorectal tumor progression and therapeutic response." *Journal of Biomedical Optics* (2020). https://doi.org/10.1117/1.JBO.25.3.035002

CONFERENCE PRESENTATIONS

Mundo, Ariel I. "Using generalized additive models for biomedical longitudinal data. *When linear models don't work*". RMedicine 2021 Conference. Recording: https://tinyurl.com/39epnrp6 Repository (slides and data): https://aimundo.rbind.io/talks/gams-biomedical/

Mundo, Ariel I., Abdussaboor Muhammad, and Timothy J. Muldoon. "Optical and molecular longitudinal tracking of primary colorectal murine tumors shows differences in the angiogenic response to maximum-tolerated and metronomic approaches." In Label-free Biomedical Imaging and Sensing (LBIS) 2021, vol. 11655, p. 116551C. *International Society for Optics and Photonics*, 2021. https://doi.org/10.1117/12.2576906

Mundo, Ariel I., Elizabeth Bullard, Kyle P. Quinn, and Timothy J. Muldoon. "Optical spectroscopic and imaging biomarkers of ulcerative colitis disease progression and remission (Conference Presentation)." In Multiscale Imaging and Spectroscopy, vol. 11216, p. 1121605. *International Society for Optics and Photonics*, 2020. https://doi.org/10.1117/12.2543369

Mundo, Ariel I., Gage J. Greening, and Timothy Muldoon. "Characterization of a multimodal endoscopically deployable veterinary spectroscopy and imaging probe to determine therapeutic response in a murine orthotopic tumor model." In Label-free Biomedical Imaging and Sensing (LBIS) 2019, vol. 10890, p. 108901L. *International Society for Optics and Photonics*, 2019.

Awards and Recognition

Fulbright Faculty Development Scholarship 2017-2019

Only two scholarships awarded for that period in the whole country

OMNI Endowed International Scholarship 2020

Granted as a scholar fulfilling the mission of the OMNI Center in Fayetteville

Professional Awareness, Advancement, and Development (PADD) Scholar 2020-2021

Received funding and participated in the PAAD program to supplement my graduate education in persuasive speaking, commercialization, and data science.

Grants

Arkansas Biosciences Institute 2021 seed grant competition 2021

Main author on a proposal submitted with my advisor to examine gene expression and optically derived markers in a mouse model of colorectal cancer ($30,000 in funding). *Proposal scored in the top 2 of all the individual research projects for the cycle*.

References

Dr. Timothy Muldoon, Associate Professor, Department of Biomedical Engineering, University of Arkansas
tmuldoon@uark.edu

Dr. Christopher Nelson, Assistant Professor, Department of Biomedical Engineering, University of Arkansas
nelsonc@uark.edu

Dr. John R. Tipton, Assistant Professor, Department of Mathematical Sciences, University of Arkansas
jrtipton@uark.edu

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01 November 2021

Dear Dr. Avasthi and Dr. Chou:

I am writing to express my interest in the Scientist (Discovery Teams) position at Arcadia Science. My PhD work has been focused on gaining a better understanding of the metabolic changes caused by colon cancer using a primary murine model. However, it has become clear to me that the way we study any disease (cancer, diabetes, obesity, etc.) in preclinical research is limited by two fundamental reasons: 1) we use animal or cellular models that approximate the behavior of a disease in humans, but that have many inherent limitations, and 2) most of the time, we only take "snapshots" of biological processes.

The first limitation has repeatedly caused a lack of correspondence in the clinical setting from many promising results seen in traditional model organisms. Despite this, those same models are used again and again without producing timely and impactful discoveries that can have a direct effect on the lives of millions of people. The second limitation is even more baffling to me: why are we so accustomed to see things only "before" and "after"? Diseases are progressive! And yet, because we routinely neglect to consider *time* in our research questions we lack fundamental metabolic and cellular information with enough temporal resolution that enables us to predict not only *how* things change but also *when* they change.

Until we acknowledge the need for longitudinal information in all areas of science, we are condemned to see not only a lack of replicability in results, but a growing disorganized array of information that will not help us give definite answers to many biological problems (e.g., the Warburg effect in cancer).

During my PhD I have started to tackle the limitations outlined above by doing longitudinal studies to examine the metabolic changes caused by cancer over time using optics and molecular biology. I have also spent a significant amount of time learning and incorporating into my work statistical methods that go beyond a mere "p-value" to assess significance.

However, I recognize that my efforts so far are a minuscule part of what is required to bring *change*. My next career goal is to produce discoveries that help address the limitations described above by using information from novel model organisms, where metabolic questions can be addressed from a different perspective and longitudinal data can be generated and shared with the broad scientific community. In the long run, I am also interested in laying the theoretical and practical foundations on *how* to address these questions systematically for any biological process in an interdisciplinary manner where novel approaches across Statistics, Biology, Bioinformatics, and Open Science can be leveraged in order to help change what we consider "paradigms" in research.

Because my work expands multiple fields, I believe my unique scientific superpower is perseverance, and I think it would be best used by designing experiments where a multidisciplinary approach is required.

I believe my career goals align with the mission of Arcadia Science, and I would be delighted to form part of a team that has Open Science and innovative ideas at its core.

Thank you for taking the time to evaluate my application. I sincerely hope to hear from you soon.

Best regards,

Ariel Mundo