

BIOGRAPHICAL SKETCH

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NAME: Rushin, Anna

eRA COMMONS USER NAME (credential, e.g., agency login): arushin

POSITION TITLE: Graduate Student

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Florida, Gainesville, FL	BS	05/2019	Biochemistry and Molecular Biology
University of Florida, Gainesville, FL	PhD		Biomedical Sciences: Biochemistry

A. Personal Statement

I was introduced to molecular biology and cell metabolism during my undergraduate research at the University of Florida. My four years of research in Dr. Christopher Martyniuk's lab aimed to determine the relative risk of pesticides and fungicides to dopamine synthesizing cells by gaining a better understanding of how these chemicals affect mitochondrial bioenergetics. I was captivated by the applications of metabolism research to human health, and knew I wanted to engage in biomedical research. My senior thesis focused on itraconazole, a fungicide that is currently being explored as a cancer therapy for non-small cell lung cancer. Overall, this experience spurred a strong interest in the cellular mechanisms that lead to disease, particularly those related to cancer metabolism. I pursued this research direction by becoming a laboratory technician in Dr. Michael Kilberg's lab. Here, I examined cell stress signaling in response to amino acid deprivation and endoplasmic reticulum stress in wild type and gene-specific knockout cell lines, with applications to tumor cells. Ultimately, I reinforced my interest in discovering how cells function and how I can obtain mechanistic insight by examining metabolism. I also discovered a passion for mentoring while teaching several undergraduate students in Dr. Martyniuk's and Dr. Kilberg's lab.

For my graduate training at the University of Florida, I am examining disease metabolism under the guidance of Dr. Matthew Merritt. Specifically, I am analyzing glioblastoma glucose metabolism and developing metabolic imaging techniques. I am also investigating pancreatic islet metabolism in live pancreas slices from mice and organ donors to study Type 1 Diabetes pathogenesis. I will expand my current technical knowledge by utilizing Nuclear Magnetic Resonance (NMR), gas chromatography – mass spectrometry (GC-MS), *in vivo* imaging, and animal surgeries in my research. I plan to continue the professional development I began in my undergraduate studies, such as attending conferences, giving poster and oral presentations, and publishing my research.

B. Positions, Scientific Appointments, and Honors**Positions and Scientific Appointments**

2015 – 2019	Undergraduate Research Assistant
2019 – 2020	Lab Technician, University of Florida
2019 – Present	Member, Phi Beta Kappa
2020 – Present	Graduate Research Assistant, University of Florida

Honors

2015	Recipient, Stephen C O'Connell Leadership Scholarship
2015	Recipient, Best and Brightest Scholarship in Business
2016; 2017	W.W. Massey Sr. Presidential Scholarship
2016 – 2019	University Scholars Program, University of Florida
2018	Carol B. Currier Scholarship
2019	B.S. Awarded, Summa Cum Laude, University of Florida
2020 – Present	Grinter Fellowship Award

C. Contributions to Science

1. Examined mechanisms underlying impaired mitochondrial bioenergetics related to chemical exposure in rat dopaminergic cells.

I was involved in several projects that assessed the impact of chemicals such as pesticides, fungicides, and insecticides on mitochondrial bioenergetics. One project examined dieldrin, an organochlorine pesticide associated with Parkinson's disease. I discovered that a protein called Chop, an apoptotic gene associated with endoplasmic reticulum stress, was induced following dieldrin treatment. This suggested for the first time that mitochondrial dysfunction due to dieldrin exposure is related to endoplasmic reticulum stress. I also investigated the interaction between the mitochondria and itraconazole, a fungicide that has been shown to block voltage dependent anion channel 1 (Vdac1), a mitochondrial outer membrane protein. I performed multiple mitochondrial toxicity assays as well as quantified cellular signaling through real-time PCR and Western Blots. I determined that Vdac1 facilitates mitochondrial dysfunction from itraconazole treatment, but that there are likely other mechanisms involved in the impaired bioenergetics. This research improves understanding as to how triazole fungicides such as itraconazole affect dopamine cells, and I will submit it as a first author publication in the coming months. Additionally, I assisted on a project that quantified mechanisms of fipronil-induced neurotoxicity in dopaminergic cells. I determined that the impaired mitochondrial bioenergetics were attributed to lower mitochondrial mass in the cells and that fipronil definitively acts as a mitotoxin.

- a. Schmidt JT, **Rushin A**, Boyda J, Souders CL, Martyniuk CJ. Dieldrin-induced neurotoxicity involves impaired mitochondrial bioenergetics and an endoplasmic reticulum stress response in rat dopaminergic cells. *Neurotoxicology* 2017;63:1–12. <https://doi.org/10.1016/j.neuro.2017.08.007>.
- b. Souders CL, **Rushin A**, Sanchez CL, Toth D, Adamovsky O, Martyniuk CJ. Mitochondrial and transcriptome responses following exposure to the insecticide fipronil on rat dopaminergic neural cells. *Neurotoxicology* 2021. <https://doi.org/10.1016/j.neuro.2021.05.011>.
- c. **Rushin A**, Souders CL, 2nd, Martyniuk CJ. 2017. Mitochondrial bioenergetics and expression profiling in rat dopaminergic cells following exposure to itraconazole. Southeast SETAC Conference, September 28-30, Brunswick GA, USA. (Platform Presentation)
- d. **Rushin A**, Boyda J, Schmidt JT, Martyniuk CJ. 2016. Mitochondrial bioenergetics are impaired by the legacy pesticide dieldrin. 7th SETAC World Congress/37th SETAC North America Annual Meeting, November 6-10, Orlando, FL. USA. (Poster Presentation)