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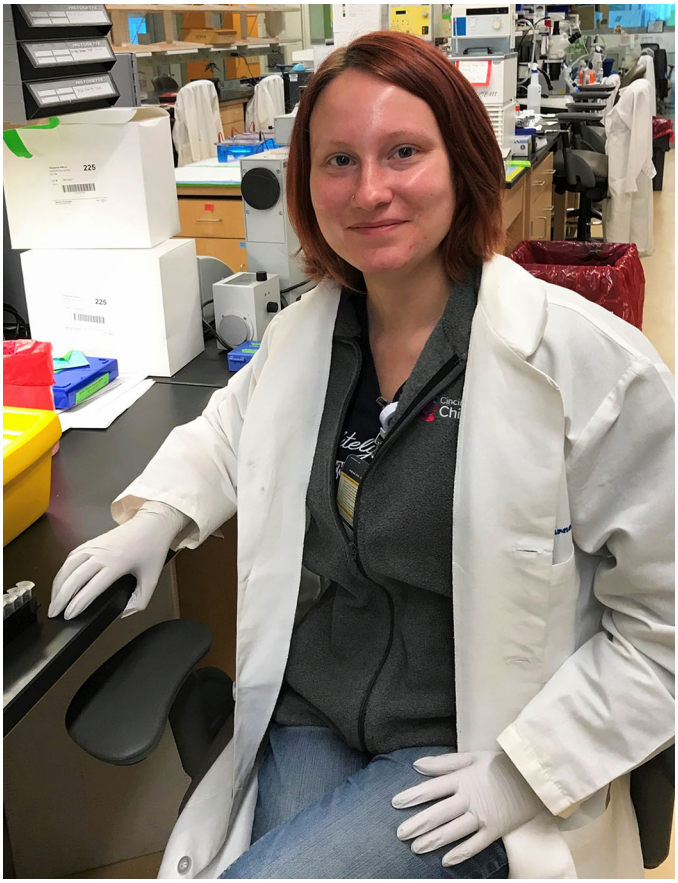
FIRST PERSON

# First person – Taylor Miller

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Taylor Miller is first author on 'Depletion of phosphatidylinositol 4-phosphate at the Golgi translocates K-Ras to mitochondria', published in JCS. Taylor conducted the research described in this article while a research assistant in Kwang-Jin Cho's lab as part of the Department of Internal Medicine, University of Cincinnati. She is now a Research Assistant III in the lab of Susanne Wells at the Cincinnati Children's Hospital Medical Center, where her research interests lie in cell signaling and how it relates to tumorigenesis.



Taylor Miller

**How would you explain the main findings of your paper in lay terms?**

We found that making cells overexpress a shortened version of a specific protein in the mitochondria, changes the cells' glucose metabolism. This alteration caused the signaling associated with a protein mutated in cancer, called K-Ras, to be reduced. We suggested that this is due to the location of two lipids (fatty molecules) called phosphatidylserine (PtdSer) and PI4P being moved from their normal locations to other parts of the cell. We were able to further show that reducing the amount or activity of PI4K, a kinase that generates PI4P at the Golgi, resulted in K-Ras and PtdSer moving from their normal locations to the same parts of the cell as when their glucose metabolism was affected. We could return all of these molecules (K-Ras, PtdSer and PI4P) back to their normal locations by simply refeeding the cells with fresh media containing glucose. This meant that PI4P can regulate where PtdSer and K-Ras are within the cell and that this depends on the available amount of glucose.

**Were there any specific challenges associated with this project? If so, how did you overcome them?**

The biggest challenge was keeping cell culturing conditions exactly the same each time you performed the experiments for confocal imaging, as the cells used were very sensitive to amounts of media given, cell number plated and time in culture. If these very specific conditions were not consistent, the cell morphology would be completely altered and produce poor images, in which true KRas mislocalization could not be differentiated. To combat this, we took the time to conduct extensive optimization (cell number, media volume, temperature, location in the incubator, etc.) and developed a specific protocol just for these particular experiments with these specific cells to increase the likelihood of achieving consistent reproducible imaging results.

**When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?**

The 'eureka' moment occurred when testing different components of complete DMEM to figure out what was returning K-Ras to the plasma membrane upon refeeding. The results were perfectly clear and it was definitive that it was glucose, which helped guide the rest of the study to successful completion and gave room for even further investigation in the future.

**Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?**

Dr. Kwang-Jin Cho was my mentor after I received my Master's degree. He took a real chance on hiring someone so fresh and new for his lab and really took me under his wing. He was always there for guidance and advice, not only with regard to my project, but also just life in general. I learned how to be a proper scientist and will never forget my time there, which has led me to where I am today.

**What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?**

I have been extremely curious ever since I was a small child and loved learning. At a young age, I already was doing 'science experiments' with mouthwash and my father's aftershave, so it was only natural for me to gravitate towards science throughout school. After several close family members and friends battled cancer, I became interested in learning why cancer is cancer and why some people are 'cured' and others are not, even when they are on the same treatments. I have been doing cancer signaling research ever since.

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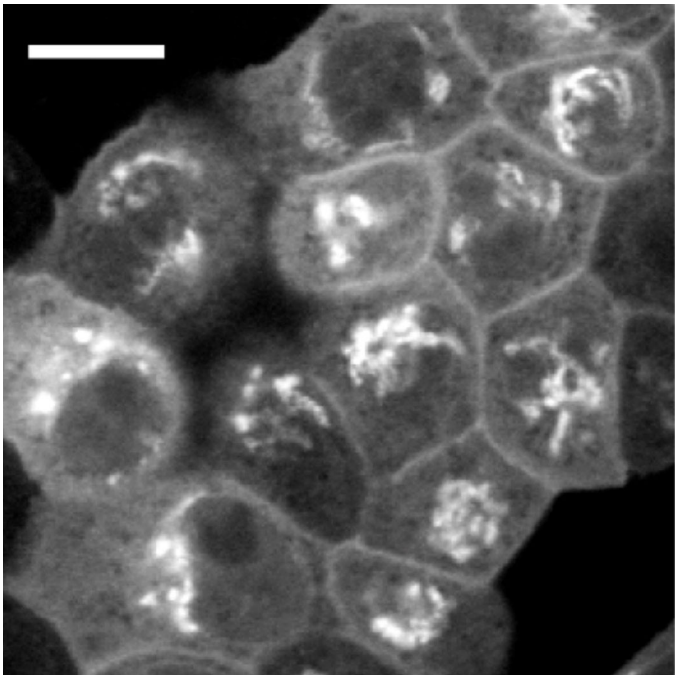

**PI4P localized to the plasma membrane and Golgi as shown by GFP–FAPP1-PH staining.**

## "At a young age, I was already doing 'science experiments' with mouthwash and my father's aftershave…"

### What's next for you?

I have no plans on leaving my current field of research any time soon. I am currently working in a new lab studying a different type of cancer, squamous cell carcinoma, and we have novel overexpression mouse model lines that I will be characterizing and doing the first studies with, particularly metabolomics, which builds upon techniques I learned during the course of this project.

### Tell us something interesting about yourself that wouldn't be on your CV

Besides being into real science, I am also a big fan of science fiction like Doctor Who, Star Wars, and anything superhero related. I have recently started to sew and cosplay, and am currently working on making four costumes from scratch for the first time.

#### Reference

**Miller, T. E., Henkels, K. M., Huddleston, M., Salisbury, R., Hussain, S. M., Sasaki, A. T. and Cho, K.-J.** (2019). Depletion of phosphatidylinositol 4-phosphate at the Golgi translocates K-Ras to mitochondria. *J. Cell Sci.* **132**, 231886. doi:10.1242/jcs.231886