

## FIRST PERSON

# First person – Eirini Tsekitsidou

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping researchers promote themselves alongside their papers. Eirini Tsekitsidou is first author on 'Calcineurin associates with centrosomes and regulates cilia length maintenance', published in JCS. Eirini conducted the research described in this article while a Graduate Student Researcher in Martha Cyert's lab at the Department of Biology, Stanford University, CA, USA. She is now a Senior Analyst at Health Advances LLC in San Francisco, CA, USA.

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

Our paper reports novel functions and target proteins for calcineurin, which is an enzyme that modifies protein activity by removing phosphate modifications from its targets. Calcineurin is best known for helping to activate our immune system and for being blocked by immunosuppressant drugs in transplant patients that need to prevent organ rejection. Our research is motivated by trying to understand the roles of calcineurin beyond the immune system, and by extension, explain why immunosuppressants often cause adverse effects. In our paper, we show that calcineurin is present at the centrosome, a small cellular organelle that is important for signaling and cell division. At the centrosome, calcineurin interacts with previously unknown target proteins such as POC5. In addition, we find that treating cells with immunosuppressants causes their cilia – or signaling 'antennas' – to grow to an abnormal length. These findings expand our current understanding of calcineurin biology and bring us closer to decoding cilia and centrosome-related pathologies.

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

One of the biggest challenges I faced was finding the right project to work on. I started this project in my third year of graduate school, after my initial project did not yield any interesting findings. My advisor's guidance helped me figure out when it was time to abandon one project and focus on another. Another challenge was trying to visualize calcineurin at the centrosome. Calcineurin is a diffuse cytosolic protein and thus hard to localize to a specific organelle. After much trial and error, I was able to localize it in two ways: one via expansion microscopy, with Dr Jennifer Wang, and the other by permeabilizing the cell membrane and letting most of the cytosol leak out before imaging. A third challenge was measuring the length of thousands of cilia within a reasonable time frame, which was solved with the help of CiliaQ, an ImageJ plugin created by Dr Jan Niklas Hansen. Discussing or collaborating with other scientists helped me to solve most challenges.



Eirini Tsekitsidou

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

I had multiple eureka moments! The first was looking at the list of calcineurin-proximal proteins we identified from mass spectrometry and realizing that most of them are found at the centrosome. This is certainly a finding I did not expect, but a very fortuitous one, since it gave me the opportunity to collaborate with the lab of Dr Tim Stearns. I say fortuitous, because the Stearns lab happened to be (1) full of experts in centrosome and cilia biology, (2) next door to the Cyert lab and (3) a lab I had previously worked in as a summer student. To me it felt like coming full circle! Other eureka moments were realizing that treating cells with calcineurin inhibitors elongates their cilia, and finally being able to visualize calcineurin at the centrosome after trying many different imaging techniques.

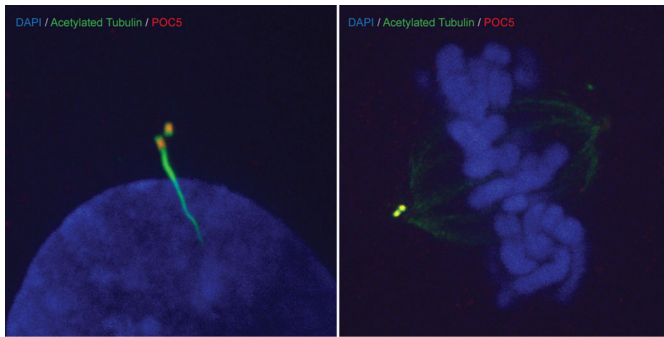
### Why did you choose Journal of Cell Science for your paper?

I chose JCS because it regularly publishes compelling articles about centrosomal and ciliary biology with an emphasis on beautiful microscopy images. Some of these JCS articles have inspired and guided my own research, so I felt that my paper regarding the role of a phosphatase at the centrosome would be a good fit.

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

I have been extremely fortunate to have had amazing mentors throughout my scientific career. During my time as an undergraduate student, Dr Steven Williams, Dr Robert Merritt, Dr Caroline Keroack, Dr Miranda Stratton and Dr Olga Cormier

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**Ultrastructure expansion microscopy of centrosomes in a quiescent, ciliated hTERT-RPE1 cell (left) and a mitotic hTERT-RPE1 cell (right).**

were instrumental in nurturing my enthusiasm for research and motivating me to believe in my potential and pursue a PhD. My PhD advisor, Dr Martha Cyert, has been an exceptional mentor who has played a significant role in my personal and professional growth. Beyond sharing her passion for phosphatase biology, she has been an unwavering source of support, taking the time to discuss my individual interests and aspirations, encouraging me to persevere through setbacks, and supporting my pursuits in teaching and mentoring. I am also very thankful for the guidance and inspiration provided by Dr Tim Stearns and Dr Jennifer Wang, who introduced me to the fascinating world of centrosomal and ciliary biology.

**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 always been fascinated by both the human body and the human psyche. I believe that before we learn anything else, it's important to try and get to know ourselves first. Studying cell and molecular biology is one of the most granular ways of getting to know how a living organism works at its most fundamental levels. This, combined with the fact that I really like drawing intricate protein interaction pathways, made me fall in love with cell biology. In terms of pursuing research, the scientists I have met along the way have been just as important as the science itself. One of the best research experiences I had was participating in the Stanford summer

research program as an undergraduate researcher in 2015. That program was crucial in my decision to pursue a PhD.

**Who are your role models in science? Why?**

I am incredibly inspired by scientists who have used their passion for research as a driving force to persist, despite facing adversity and discouragement. I personally know scientists who refused to give up, even when they were rejected from their dream PhD program, failed their PhD qualifying exams, lost a faculty position or grant or a prestigious fellowship, or had their experiments return non-significant results and their manuscripts rejected. Besides my own friends and mentors, an inspiring role model for me is Dr Katalin Kariko, a European, first-generation, female scientist like myself. I admire how tenaciously she pursued her research in mRNA despite facing numerous challenges. Because of her unwavering dedication, she was instrumental in the development of the COVID-19 vaccines.

**What's next for you?**

Since writing this paper, I finished my PhD and have started working as a strategy consultant for the biopharmaceutical and healthcare industries. I am thankful to an innovative place such as Stanford for teaching me about the multitude of ways of contributing to science, many of which do not involve using a pipette. As a strategy consultant, I will have the opportunity to learn about a plethora of new scientific ventures while also helping to translate them into clinical impact.

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

I have many passions besides biology and research! I especially enjoy scientific teaching and mentorship. I spent a lot of my time as a PhD student doing so and was ecstatic to earn the biology department's teaching centennial award at Stanford! I also love learning about new cultures, and I am currently learning to speak Spanish.

**Reference**

Tsekitsidou, E., Wong, C. J., Ulengin-Talkish, I., Barth, A. I. M., Stearns, T., Gingras, A.-C., Wang, J. T. and Cyert, M. S. (2023). Calcineurin associates with centrosomes and regulates cilia length maintenance. *J. Cell Sci.* **136**, jcs260353. doi:10.1242/jcs.260353