FIRST PERSON

First person – Izzy Owen

How would you explain the main findings of your paper in lay terms?
Cancer is often driven by specific oncogenic proteins. This work focuses on an oncogenic fusion protein known as FUS-CHOP, which causes myxoid liposarcoma. It was previously understood that expression of FUS-CHOP in cells results in tumor formation, but the mechanism was unknown. The previous work in our lab focused on the ability of FUS to undergo liquid–liquid phase separation (LLPS), which is a phenomenon in which certain proteins and nucleic acids condense into distinct liquid structures where different cellular functions occur. Cellular phase separation is often compared to an oil droplet in water, with two liquid phases existing together, but separated. Our research suggests that the FUS portion of the FUS-CHOP fusion drives LLPS in the nucleus of cells, whereas CHOP alone does not have this property. We show that phase-separated FUS-CHOP recruits transcriptional proteins in the nucleus, which could explain the unique gene expression pattern that occurs during oncogenesis and tumor formation. These findings have potential application in creating targeted therapies for patients who suffer from myxoid liposarcoma.

Were there any specific challenges associated with this project? If so, how did you overcome them?
This project was a new avenue for the lab. Our previous work focused on the role of FUS in neurodegenerative diseases, so understanding the protein’s role in cancer was something we had never studied. It was a fantastic opportunity to expand my research interests and characterize similarities of pathogenic FUS in both neurodegeneration and cancer. It was fundamentally challenging because it was our first project focused on molecular cancer biology, requiring development of new methodologies and knowledge. The most technically challenging aspect was visualizing condensate fusion over both time and space. To do this, we had to develop novel microscopic methods to capture the quick fusion events while also rendering the cell in three dimensions. It took several trials with the confocal microscope to determine the best settings to effectively collect these data.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?
My direct mentor, Frank Shewmaker, has been instrumental in both science and career guidance over the past four years. Studying oncogenic fusion proteins was not originally part of his research program, but he supported my ideas and encouraged me to develop independent goals. We also discussed practical issues for navigating life, graduate school, family and career options. I’m grateful for this

Why did you choose Journal of Cell Science for your paper?
Journal of Cell Science is known for publishing cutting edge research in both cell and molecular biology. JCS also has a quick and effective review process, which we felt was important for the timely publication of our work. Our work’s focus on the molecular details of protein phase separation, while also thinking about mechanisms underlying cellular transformation, seemed like a perfect fit for JCS.

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type of intellectual environment because it helped me reach higher standards and achieve greater goals.

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 was always motivated by the unknown. I learned early that the more you know, the more you realize how much is unexplained. Human biology is full of unanswered questions, and, unfortunately, some of these unknown variables cause disease. I am pursuing a career in science because I am motivated, intelligent and driven to explore that which is undiscovered in biology. I hope to see new knowledge translated into treatments for human diseases.

Who are your role models in science? Why?

Jennifer Doudna is one of my scientific role models because she is a strong, brilliant and tenacious scientist. Her work involving CRISPR has been monumental in all fields of biology. She came to our university and spoke about her journey and how she navigated through all of the challenges of fundamental biological research. She was humble and a great example and motivator for young scientists like myself.

What’s next for you?

In the fall, I will be starting a post-doctoral position in the Neuroscience Research Institute at Allegheny General Hospital in Pittsburgh, PA. My future goal is to pursue a research position in industry because I want to be more involved in the application and development of scientific advances. I would love to be part of a company whose research directly impacts patients’ lives and well-being.

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

I was a captain of the cheerleading squad in middle school, high school and college. It was a passion of mine and I haven’t found many scientists who share the same sentiments!

Reference