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FIRST PERSON

First person – Sarah Barger

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. Sarah Barger is first author on 'Nuclear envelope assembly relies on CHMP-7 in the absence of BAF–LEM-mediated hole closure', published in JCS. Sarah is a Postdoctoral Fellow in the lab of Shirin Bahmanyar at Yale University, USA, investigating the role of nuclear envelope proteins in cancer initiation and progression.

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

Every time a cell divides, the membrane that surrounds our DNA, called the nuclear envelope, breaks down. In the new daughter cells, the nuclear envelope then reseals again to form a closed compartment around the DNA. How this process of breaking down and resealing occurs is unknown. Importantly, failure to properly reform the nuclear envelope leads to DNA damage and is linked to cancer. Using live-cell imaging of nuclear envelope formation in the early embryo of the worm *Caenorhabditis elegans*, we show that the DNA-binding protein BAF binds to specific proteins within the nuclear envelope membrane to promote proper sealing. Through genetic analysis, we discovered which of these nuclear envelope membrane proteins play important roles in nuclear assembly and which ones function redundantly. One such protein, the ESCRT-II/III protein CHMP-7, becomes critical for rebuilding the nucleus when nuclear envelope sealing is faulty. All in all, we were able to molecularly dissect nuclear envelope sealing and its impact on nuclear assembly, and see how this affects the development of the embryo into a worm.

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

Quite far along into my research project, my lab discovered that a worm strain that we thought was a protein knockout strain was misannotated and produced instead a truncated protein product. This was very disheartening because I had already gathered a lot of data using this strain. To overcome this, I created a true knockout strain using CRISPR/Cas9 gene editing and worked efficiently with the new strain to make up for lost time. By combining our prior work on the truncated strain with new data using the knockout strain, we were able to make discoveries that could not have been made with either strain alone.

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

When we removed *chmp-7* in our BAF mutant strain, we observed that one of the nuclei in the *C. elegans* embryo sometimes crumples or collapses. This was a particularly striking result because it was specific to the nuclei that needs to seal or close a large hole in the nuclear envelope surrounding meiotic spindle microtubules. This finding therefore exposed a key feature important for nuclear envelope assembly after sealing.

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Sarah Barger

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

Journal of Cell Science has a broad readership and publishes top-notch research on cell biology, often featuring beautiful microscopy data. I have always wanted to publish in Journal of Cell Science and am happy my work made the cut.

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

When preparing this manuscript, all the members of the Bahmanyar lab provided critical feedback on designing figures and framing the story. Aside from my lab members, I meet with a small group of other postdocs and a faculty member (all from different departments/fields) every month. This group provides career advice, general feedback on my progress and emotional support. It's helpful to receive guidance from outside my field and it's given me the opportunity to learn about postdoc expectations/experiences in other labs and departments.

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?

What I love about science is the moment of discovery and that you are perhaps the first person in history to be conducting that experiment and making that observation. There's so much about cell

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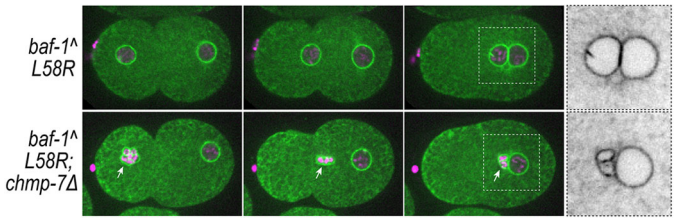

Pronuclear migration in *C. elegans* embryos expressing endogenously tagged LEM-2:mNeonGreen and mCherry:Histone2B. LEM-2:mNeonGreen is in green and mCherry:Histone2B in maroon. Loss of CHMP-7 in BAF-L58R mutant embryos induces collapse of the oocyte pronucleus.

science we've yet to learn, and I want to contribute to that body of knowledge. I also find working in a lab to be both enjoyable and relaxing. The most interesting moments during my training have been the opportunities to participate in hands-on courses (such as the Quantitative Imaging course at Cold Spring Harbor) and visit other labs. It's fun to learn new techniques and see how other labs approach scientific problems.

Who are your role models in science? Why?

I often look up to scientists that have had to fight for proper recognition of their work – scientists that had to deal with years of negative feedback or lack of funding before finally achieving success. I admire these scientists for their steadfast commitment to their data.

What's next for you?

For the time being, I will continue my postdoctoral training at Yale University. This fall, I will get the opportunity to teach in an introductory cell biology course for undergraduates. I also take time to facilitate the science communication course run virtually by the American Society for Biochemistry and Molecular Biology. Ultimately, I hope these experiences will make me better equipped to direct my own research program in the future.

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

I've recently become interested in Formula 1 racing thanks to the Netflix show 'Drive to survive'. I appreciate the set-up of the sport; there are 10 teams, each with two drivers. I like how international it is and that winning requires a huge team effort. I often liken the Team Principals in F1 to Principal Investigators in a lab.

Reference

Barger, S. R., Penfield, L. and Bahmanyar, S. (2023). Nuclear envelope assembly relies on CHMP-7 in the absence of BAF–LEM-mediated hole closure. *J. Cell Sci.* **136**, jcs261385. doi:10.1242/jcs.261385