

FIRST PERSON

First person – Chih-Wen Chu

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. Chih-Wen Chu is the first author on 'The Ajuba family protein Wtip regulates actomyosin contractility during vertebrate neural tube closure', published in Journal of Cell Science. Chih-Wen is an associate scientist in the lab of Sergei Sokol at Icahn School of Medicine at Mount Sinai, New York, USA, investigating apical constriction and planar cell polarity, with a focus on protein dynamics at the cell junctions.

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

Our brain and spinal cord develop from an embryonic tissue called the neural tube. The neural tube starts as a flat sheet of cells known as the neural plate, and over time it folds inwards to form a tube. Since the inner surface of a tube is smaller than its outer surface, the apical (top) surface of the neural plate has to shrink to become the inner surface of the neural tube. This shrinking behavior, called apical constriction, is necessary for neural tube formation, and a protein called Shroom3 is required to initiate it. As a result of apical constriction, tensile forces are created along the apical cell–cell borders. Wtip belongs to a protein family that has been proposed to sense tension at the cell borders, but its role in apical constriction has remained unclear. This paper presents two major findings. First, Wtip is localized to the apical junctions, and this distribution pattern changes in response to tension. Second, Wtip is required for apical constriction in the neural plate. It may function by binding to Shroom3 and bringing it to apical cell borders. In summary, our findings show that Wtip not only senses tensile forces but also participates in tension generation processes during apical constriction.

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

One challenge was to visualize Shroom3 protein expression by western blotting. Shroom3 is very active in the early embryo. As a result, the amount of the protein suitable for phenotypic studies was not enough to be detected on western blots, and overexpression of Shroom3 protein was fatal for the embryos. I overcame this issue by dissecting the tissue expressing Shroom3, so that Shroom3 was enriched in each sample. It was a lot more work compared to just using the whole embryo, but it worked fine for me.

“Every piece of data brings in a small eureka moment, as we are getting closer to the answer.”

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

Yes. Every piece of data brings in a small eureka moment, as we are getting closer to the answer. But there are definitely ones



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that are more memorable than others. As the distribution of Wtip at the junctions switched from punctate to continuous in response to apical constriction, we speculated that this pattern would reverse if apical constriction were disrupted. After I interfered with apical constriction in neural plate cells expressing Wtip, I indeed saw the redistribution of Wtip at the junctions, from a continuous pattern to a punctate one. That was a big eureka moment for me.

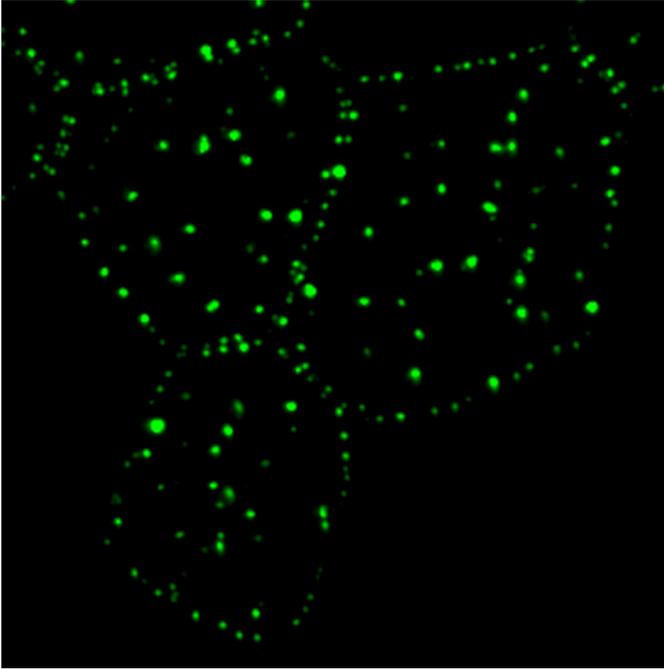
Have you had any significant mentors who have helped you beyond supervision in the lab?

I have been lucky enough to have several great mentors and I am very grateful for their support. My PhD advisor Dr Hui Zou let me develop my own project and trained me to complete it independently. He taught me valuable lessons of scientific methodology, such as planning your experiments and verifying all the reagents ahead of time, the importance of positive and negative controls, and taking any scientific statement with a grain of salt. My postdoc mentor Dr Sergei Sokol helped me further improve my ability to be an independent scientist and explore different opportunities outside the lab. I also learned a lot from him regarding various communication skills and being a mentor myself.

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 enjoyed observing all kinds of life forms since I was a child. I brought home different kinds of caterpillars that I found in the garden, fed them and watched them become butterflies or moths.

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Xenopus ectodermal cells expressing GFP-tagged Wtip N-terminal fragment, showing punctate signals paired across cell–cell junctions.

For that reason, it was a natural decision for me to choose to be a biologist and I started working in a lab while in high school. It was very rewarding when I saw my experiment work for the first time. For me, there may not be a single most interesting moment on my career path, but rather plenty of satisfying moments when I see some new and exciting phenomenon or when my experiment works as expected. These moments and the possibility of finding more later on are what keep me motivated.

“I have enjoyed observing all kinds of life forms since I was a child.”

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

When not in the lab, I enjoy cooking, hiking, and taking photos of many things, from Mother Nature, street views at the corner to any interesting or ‘magical’ moments I encounter. I also have a tank of tropical fish, and it's relaxing to watch them swimming around after I've had a long day at work.

Reference

Chu, C.-W., Xiang, B., Ossipova, O., Ioannou, A. and Sokol, S. Y. (2018). The Ajuba family protein Wtip regulates actomyosin contractility during vertebrate neural tube closure. *J. Cell Sci.* **131**, jcs213884.