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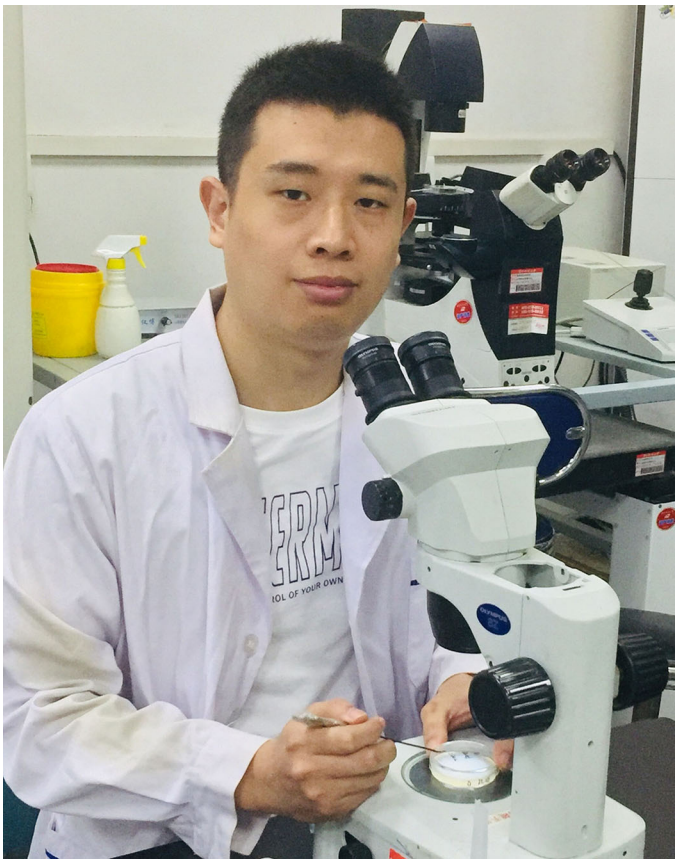
FIRST PERSON

First person – Xuemeng Shi

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. Xuemeng Shi is first author on 'WIP-1 and DBN-1 promote scission of endocytic vesicles by bridging actin and Dynamin-1 in the *C. elegans* intestine', published in JCS. Xuemeng is a PhD student in the lab of Rongying Zhang at the Key Laboratory of Molecular Biophysics of the Ministry of Education, Hubei, China, investigating intracellular transport along the endocytic pathway.



Xuemeng Shi

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

Endocytosis is a cellular process in which proteins, lipids and other materials are internalized into the cell. Clathrin-mediated endocytosis is the major pathway for internalization, during this process, plasma membrane will be invaginated and finally be pinched off to form intracellular vesicles. Lots of molecules have been reported to function in this process; actin and dynamin are the dominant regulators, however, the relationship and interaction between them vary widely in different cell lines and organisms. Here, by taking advantage of the powerful genetic tools available for *C. elegans*, we revealed that two actin-binding proteins link actin to endocytic sites and cooperate with dynamin for vesicle generation in the *C. elegans* intestine.

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

Of course, at the beginning of this project, we carried out a genetic screen to identify potential candidate proteins whose knockout/knockdown could affect endocytosis of the human transferrin receptor (hTfR). Then we observed that loss of WIP-1, DBN-1 or DYN-1 results in prominent basal accumulation of hTfR in tubular structures and decreased numbers of puncta in the cytoplasm. This raised some questions. Do these proteins form a complex to regulate endocytosis of hTfR? Do the tubules derive from the plasma membrane? Our lab had no expertise at performing *in vitro* protein–protein interaction and transmission electron microscopy, and additionally, specific antibodies used for *C. elegans* proteins are not easy to obtain, so it is difficult for us to use biochemistry methods to interpret these questions. However, by taking advantage of the powerful genetic tools available for *C. elegans* and the high-resolution of live-cell imaging, we revealed the assembled actin filaments and DYN-1 act cooperatively for the scission of clathrin-coated pits and that actin assembly contributes to the recruitment of dynamin.

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

It has been previously reported that EHD1/RME-1 functions in mediating membrane fission to generate recycling carriers rather than to regulate clathrin-dependent endocytosis. However, it was particularly impressive to observe that RME-1 is aberrantly recruited to and further stabilizes the unsuccessful scission tubules, but does not promote fission in *wip-1* mutant animals. This is the first time a novel role for RME-1 in clathrin-dependent endocytosis has been revealed. Further research is needed to explore how lipid components or membrane tension of the *C. elegans* intestine responds to the attenuated scission.

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

To be honest, I was deeply impressed by the high quality and beautiful figures published in Journal of Cell Science. Additionally, our team's major work is focused on intracellular transport on the endocytic pathway by using live-cell imaging, which is totally within the scope of Journal of Cell Science.

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?

When I was a little boy, my father sent me a series of encyclopedia books as a birthday present and I have read many scientific stories about biology, physics and astronomy from these books. Actually, I was not able to understand the science at the time, but these stories deeply influenced me and made me fall in love with scientific research.

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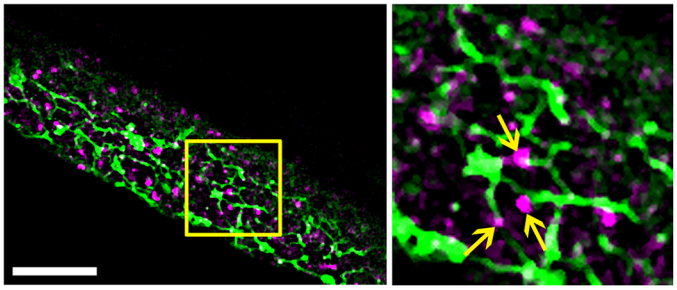

Defective scission of clathrin-coated pits results in tubular structures. This image shows tubular structures containing hTfR (green) capped by clathrin (magenta) in *wip-1* mutant intestines, as indicated by the arrows in the inset on the right. Scale bar: 20 µm.

There are still so many open or unanswered questions in scientific research, and the more we know, the more we realise we don't know. Even though we need to spend lots of time and energy to solve only a small part of the questions, the process is interesting and meaningful.

What's next for you?

I am particularly interested in the study of cytoskeleton, and after completion of my PhD, I will start work as a postdoc at the Chinese Academy of Sciences and continue to focus on actin and cell morphogenesis research.

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

Playing Rubik's cube can give me some inspiration on scientific research. It is challenging but amazing to solve a magic cube in a short time. In addition, I am particularly interested in watching Formula 1 grand prix at weekends. The high speed and overtaking deeply attracted me. Jenson Button is my favorite driver, even though he is now retired; I always act like Jenson when driving racing cars in digital F1 games.

Reference

Shi, X., Duan, F., Lin, L., Xu, Q., Xu, T. and Zhang, R. (2019). WIP-1 and DBN-1 promote scission of endocytic vesicles by bridging actin and Dynamin-1 in the *C. elegans* intestine. *J. Cell Sci.* **132**, 228023. doi:10.1242/jcs.228023