

FIRST PERSON

First person – Yuejiao Ma

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. Yuejiao Ma is first author on 'CHIR-99021 regulates mitochondrial remodelling via β -catenin signalling and miRNA expression during endodermal differentiation', published in JCS. Yuejiao is a PhD student in the lab of Haiyan Zhang at the School of Basic Medical Science, Capital Medical University, Beijing, China, investigating the differentiation of human adipose stem cells, as well as hepatocytes and mitochondria.

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

The mitochondrion is a two-layer membrane-organized organelle that makes energy for the cell, called its 'power house'. However, mitochondrial changes during cell differentiation are not clear. We found that the small-molecule inhibitor CHIR-99021 can upregulate β -catenin expression and promote adipose stem cell differentiation and mitochondrial maturation. When we blocked mitochondrial dynamics, stem cell differentiation was impaired. In addition, when we downregulated β -catenin expression, the mitochondrial structure was disrupted and the products of ATP were decreased. These data demonstrate that CHIR-99021 plays a role in the development of mitochondrial structure and their ability to produce ATP through activation of the β -catenin signalling pathway. Our study reveals changes in mitochondrial structure and function during cell differentiation and development.

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

The most challenging aspect of the project was the preparation of cell samples for transmission electron microscope (TEM) analysis. When we collected the cell pellet by centrifugation, we had to use low-speed centrifugation in order to prevent damage to the organelle structure. However, the cell pellet collected at lower speeds is loose and not ideal for TEM sample preparation. To resolve this, we used low-melting-point agarose to physically fix the cell pellet. This both protected the integrity of the organelle structure and allowed the cell mass to reach a suitable degree of compactness for preparation of TEM samples.

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

The most striking and surprising finding of our study came from the real-time ATP production rate assay using a Seahorse XFe 24 analyser. As the glycoATP production rate and the mitoATP production rate can be detected and calculated separately, we could understand the different ways that energy is generated between different cell types.

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

We think Journal of Cell Science is a very respected journal in the field of cell biology, and we have benefited a lot from the journal. It



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covers a range of interesting discoveries based on cellular mechanisms relevant to basic cell biology. Our research focuses on the remodelling of mitochondria in cell differentiation. So we believed it was the appropriate platform to report our study.

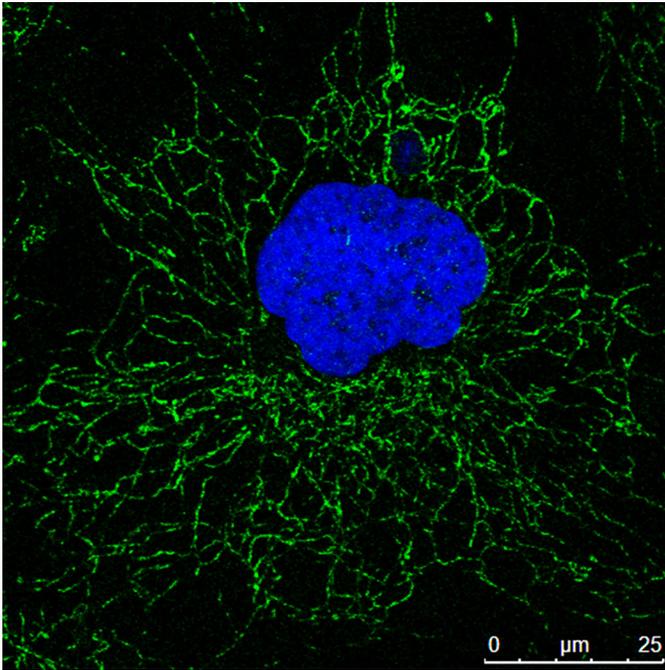
Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

I sincerely thank my teacher, Prof. Zhang, for her strict guidance and cordial care. Every step, from the selection of the topic to the completion of the paper, is devoted to my teacher's efforts. She not only taught me the ideas of doing scientific research, but also taught me valuable lessons of being human, so I can happily engage in scientific research.

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 am very fortunate to be part of a medical family. I grew up near the hospital where my father worked and this planted my medical dream in my heart when I was a child. After growing up, I found that scientific research can also support clinical treatment. I preferred to explore the charm of unknown science, so I chose to pursue a PhD in cell biology.

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Immunofluorescence analysis showing mitochondrial transcription factor A (TFAM) (green), and nucleus (blue) in human definitive endodermal progenitor cells.

Who are your role models in science? Why?

Longping Yuan, a Chinese hybrid rice breeding expert, the pioneer of research and development of hybrid rice, is known as the 'father of the world's hybrid rice'. Longping Yuan is committed to hybrid rice research, taking China's research always to world-class levels. He has travelled to India, Vietnam and other countries to teach hybrid rice technology to help overcome food shortages and hunger. He has made outstanding contributions to China's food security and the world food supply.

What's next for you?

I'm in the second year of my PhD. I am currently working on the regulation of hepatocyte polarity. After graduation, I will see what the possible options are for me. I'm interested in cell biology research, so I hope that I can engage in scientific research in the future.

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

In my spare time, I enjoy listening to music, walking and taking photos. I think it is the best way to relax after a hard working day.

Reference

Ma, Y., Ma, M., Sun, J., Li, W., Li, Y., Guo, X. and Zhang, H. (2019). CHIR-99021 regulates mitochondrial remodelling via β -catenin signalling and miRNA expression during endodermal differentiation. *J. Cell Sci.* **132**, jcs229948. doi:10.1242/jcs.229948