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FIRST PERSON

First person – Yi Liu

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. Yi Liu is first author on 'Direct interaction between CEP85 and STIL mediates PLK4-driven directed cell migration', published in JCS. Yi conducted the research described in this article while a PhD student in Dr Laurence Pelletier's lab at Lunenfeld-Tanenbaum Research Institute, University of Toronto, Canada. He is now a Postdoc in the lab of Dr Rudolf Jaenisch at Whitehead Institute for Biomedical Research, MIT, USA, where he uses stem cells to study complex human brain disorders.

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

Metastasis is of paramount importance in the prognosis of cancer patients. Malignant cancer cells acquire the motile ability to invade the surrounding tissues and penetrate the vascular circulation to produce secondary tumors, which is the major cause of mortality of most cancer patients. The PLK4 gene has recently been proposed as a prime target for cancer therapeutics since its upregulation has a great impact on cancer metastasis. Hence, our work aims to characterize the molecular basis of PLK4-driven cancer cell motility. We found that CEP85 and STIL proteins form a complex that regulates PLK4 activity and thereby plays a critical role in cancer cell migration. Molecularly, this complex was shown to modulate the organization of actin, a major type of cytoskeleton that controls cell motility. Given the importance of the elevated level of PLK4 described in aggressive cancers, the interaction between CEP85 and STIL might be a potential therapeutic option for tumor cells with PLK4 overexpression.

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

The centrosome has been long appreciated for its role in directional cell migration and for the maintenance of polarization. One of our first challenges lay in the need to knockdown the gene expression of PLK4 or other regulators while maintaining the centrosome number. We tried different approaches and compared many methods to solve this problem. Finally, we were able to establish a robust assay using starvation conditions to arrest the majority of cells in G1 phase at the same time achieve reasonable siRNA knockdown efficiency.

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

PLK4 is well known as a master regulator of centrosome biogenesis. Our recent work identified an atypical function of the PLK4–Aurora B complex in mediating non-directional cell migration in a centrosome-independent manner. I was inspired by this finding and became interested in the non-canonical role of PLK4 in directed cell movement. I cannot forget visualizing the drastic changes in directional cell migration and actin reorganization after PLK4 inhibition under the super-resolution microscope. It supported our hypothesis and was such a eureka moment for me.

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Yi Liu

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

Journal of Cell Science publishes cutting-edge research across all areas of cell biology. It provides rigorous peer review, swift publication and editorial processes, and high standards of production. It involves many world-renowned cell biologists on the editorial board and has a broad audience of cell biologists. Our research ties into the journal focus and we wanted to publish in a journal that would allow this work to get a great reach.

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

My PhD supervisor Dr Laurence Pelletier is an amazing mentor who has always believed in me and encouraged me to become the scientist that I am today. He always encourages his team to work on new ideas and explore new technologies. I was motivated by his curiosity for science and passion and optimism for life, which has made him a fantastic mentor and friend throughout my career. I also had a fantastic time travelling to Paris with him for the 'Building the Cell' Congress and loved his wine recommendations.

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?

The people who saw me growing up wouldn't believe where I am today. As a kid, I used to spend all my time on the basketball court and was far from a stellar student in the classroom. I felt doubtful about my future until getting into the world of scientific research as a summer student in a stem cell lab. I discovered a true passion for cell biology and knew that I would be a scientist from then on. The most rewarding part of this path is that it gives you well-rounded

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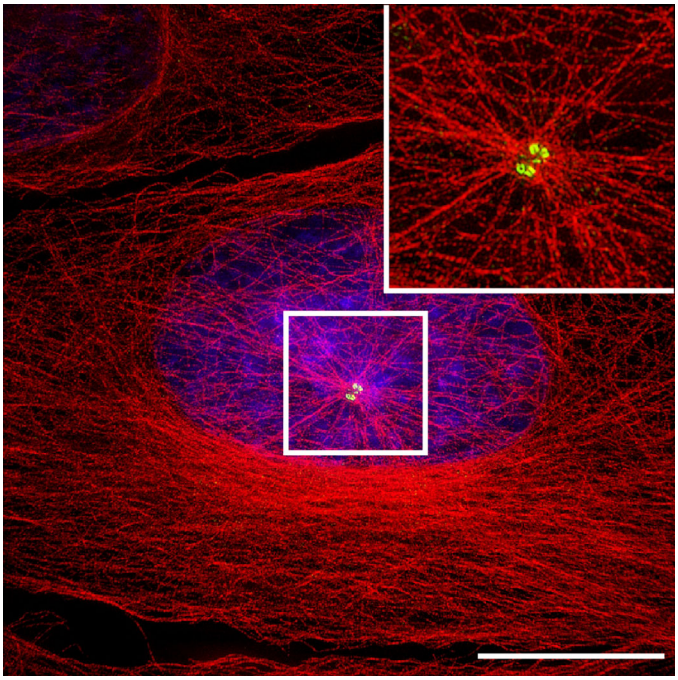

The centrosome functions as a major microtubule-organizing center in human cells. 3D-SIM micrographs of U-2 OS cells labelled with CEP120 (a centriole marker) in green, a-tubulin (a microtubule marker) in red, and DAPI (a nuclear DNA marker) in blue.

capabilities that can be put to use in many other walks of life. It is a continuous learning curve no matter what stage you are at. I hope my personal experience can tell young STEM students that if you genuinely enjoy what you are doing, then you are likely to work hard towards it and achieve seemingly impossible goals.

Who are your role models in science? Why?

I had the privilege to work with many extraordinary scientists around the world, and they all inspired me in different ways. Dr Huashun Li at State Key Laboratory of Biotherapy was my very first mentor who fundamentally shaped my way of creative and conceptual thinking. Dr Alan Garen at Yale University, who co-discovered the stop codons of the genetic code, was also one of my early mentors and role models. My PhD supervisor Dr Laurence Pelletier at the University of Toronto and collaborator Dr Mark van Breugel at MRC in Cambridge are both inspiring scientists that I learned immeasurably from. Their excitement for innovation and love for science are contagious. My current supervisor, Dr Rudolf Jaenisch at Whitehead Institute for Biomedical Research, is a pioneer in the field of transgenic science, epigenetics and stem cell biology. Rudolf always has brilliant ideas and tremendous energy to develop new approaches in science. He continues to be my inspiration and role model every day.

What's next for you?

After completing my PhD at the University of Toronto, I recently became a postdoctoral researcher in the laboratory of Dr Rudolf Jaenisch at Massachusetts Institute of Technology. My current work is centered on stem cell biology and translational medicine, in particular, dissecting the molecular properties of phase separation in transcriptional regulation. In the future, I would like to have the opportunity to run my own lab with a primary focus on using stem cells to study complex human brain disorders.

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

I share the passion for science with my fiancée Erika, who is a biomedical engineer and an exceptional scientist. We hope to collaborate scientifically someday. Besides science, we share unconditional love for our dog Jacob.

Reference

Liu, Y., Kim, J., Philip, R., Sridhar, V., Chandrashekhar, M., Moffat, J., van Breugel, M. and Pelletier, L. (2020). Direct interaction between CEP85 and STIL mediates PLK4-driven directed cell migration. *J. Cell Sci.* **133**, jcs238352. doi:10.1242/jcs.238352