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FIRST PERSON

First person – Paula Slater

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. Paula Slater is first author on 'XMAP215 promotes microtubule–F-actin interactions to regulate growth cone microtubules during axon guidance in *Xenopus laevis*', published in JCS. Paula conducted the research described in this article while a postdoc in Laura Anne Lowery's lab at the Department of Biology, Boston College, MA. She is now a postdoc in the lab of Juan Larraín at the Department of Cellular and Molecular Biology, Pontificia Universidad Católica de Chile, investigating neuronal development and regeneration.

Paula Slater

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

During neuronal development, neurons extend axons that navigate the embryonic terrain to find their targets and generate connections. In the tip of the axon there is a structure called growth cone, which is responsible for properly steering the axon. The growth cone detects signals and respond to those signals generating a mechanical response from the axon (advance, turn or retract). The axon mechanical response is achieved by the coordination of two structures that function as scaffolding and highways for the growth cone. How the coordination of these structures is regulated and triggered by the signals is unknown. In this work, we suggest that the protein XMAP215, which was previously shown to be necessary for axon outgrowth, is able to regulate the coordination of these structures in the axon growth cone when exposing the neurons to repellent signals, acting like a bridge between these two scaffolding and/or highway structures.

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

Yes, I had two strong mentors. Firstly, my PhD mentor, Katia Gysling pushed me to pursue an academic career and to love research for was it is, and to be resilient and perseverant. She did this by having nurturing scientific and personal discussions, talking to me about her experience and giving sincere advice. The second was my postdoc mentor, Laura Anne Lowery. She taught me soft skills and to feel OK – and even empowered – when getting out of my comfort zone. These are skills that are not easily gained and that no one usually teaches you them, but they are the motor of the scientific career.

What changes do you think could improve the professional lives of early-career scientists?

Following a scientific career is hard work. You have to move from performing experiments to being in charge of a project, writing grants, obtaining money to perform research, guiding and managing people, and so on. The path that we have to follow to achieve this and develop the necessary skills, especially soft skills such as communication skills and project management, are taught by no one. To improve, it is necessary to learn from the experience of others. Therefore, having good mentors is crucial, especially having an open relationship, in which you can tell your mentor about your goals and create a plan together to achieve them. Additionally, having courses, or coaching, on communication and project management, is of great importance as well.

What's next for you?

I am particularly interested in pursuing an academic career focused on the study of neuronal development and regeneration. After studying the cytoskeletal dynamic underlying axon growth and path finding during neuronal development during my first postdoc in the Lowery lab at Boston College, USA (the work that it is being published here), I thought that that it was necessary to learn more about the regeneration aspect. Thus, I joined the Larraín lab at Pontificia Universidad Católica de Chile, Chile, for a second postdoc, were I am focusing on the study of mitochondrial contribution on spinal cord and axon regeneration after spinal cord injury and axotomy.

What are the main advantages and drawbacks of the model system you have used as it relates to the focus of your investigation?

Xenopus laevis is an ideal model system to study cytoskeletal dynamics during axon pathfinding. For studying axon pathfinding, it is necessary to image the axons for long periods of time. *Xenopus laevis* spinal cord explants are relatively easy to obtain and culture, and they do not need any special culture conditions, such as

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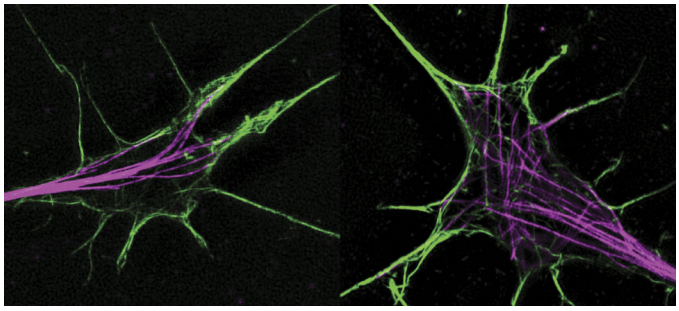

Control growth cone faced to a XMAP215 knockdown growth cone, obtained from *Xenopus laevis* spinal cord explants. Microtubules are shown in magenta and F-actin in green.

temperature control and CO_2, allowing for long imaging periods. Additionally, for studying the axon growth cone cytoskeleton, it is necessary to have a model system with large growth cones. Indeed, *Xenopus laevis* presents one of the largest growth cones. Finally, *Xenopus laevis* has a tetraploid genome that, even though it hinders genomic manipulation, has been sequenced and displays high gene collinearity with the human genome, and there are multiple developed techniques to induce gene manipulation.

What is the medical relevance of your research?

Some neurodevelopmental and mental health disorders, like autism spectrum disorders and schizophrenia, are characterized by abnormalities in neuronal development and neuronal connections. The understanding of neuronal developmental processes, like how the microtubule polymerase XMAP215 regulates microtubules within the axonal growth cone and why it is necessary for continuous axon outgrowth, could contribute to the generation of new or improved treatments and/or preventions of these disorders.

Reference

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