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FIRST PERSON

First person – Satish Bodakuntla

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. Satish Bodakuntla is first author on 'Tubulin polyglutamylation is a general traffic-control mechanism in hippocampal neurons', published in JCS. Satish is a postdoc in the lab of Dr Carsten Janke at Institut Curie, Orsay, France, investigating the molecular mechanisms behind microtubule organization and functions.

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

Nerve cells in our brain can connect over great distances through very long and slender extensions, called the axons. The main function of axons is signal transmission via electrical impulses, and to be able to do so, the neuron needs to coordinate many different tasks it performs. For instance, there is a variety of tiny cargoes that need to be delivered to distinct destinations inside the cell. This is essential for the life of the cell, and dysfunction of this transport often leads to neuron death, in other words, to neurodegeneration.

For delivering cargoes to specific destinations, one needs a path and a transport vehicle. The vehicles in nerve cells are molecular-scale motors hooked up to different cargoes. The path is a kind of railroad made from a structure called microtubules. These microtubules span the entire cell, and cargo transporters are able to walk along them. How does the motor know where to deliver its cargo? There is a system of 'traffic signs' directly fixed on the path: these are chemical modifications of microtubules that might be recognized by the passing motor thus directing them to their final destination.

In our previous publication, we have shown that altering these traffic signs on microtubules of nerve cells can lead to their degeneration, but managed to get only a glimpse into the underlying molecular mechanisms. In the current publication, we provide more detailed mechanistic insights by showing that altering these traffic signs disrupt the movement of functionally different cargoes that are very important for the survival of neuron. As transport problems induced by misguided cargoes can lead to neurodegeneration, repairing the traffic signs in such cases could be a way to restore a functional cargo trafficking, and thus save the nerve cells from degeneration.

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

Despite excessive levels of tubulin polyglutamylation (i.e. defective traffic signs on the railroad), intracellular trafficking in the axons still works, but is less efficient. So, one particular challenge was to measure these small differences in the axonal transport. Given the complexity of the neurons, this task became intricate as there is an inherent heterogeneity among the cells. To overcome this, we included a large number of vesicles for the analyses, and statistically tested our hypothesis with multiple independent experiments.

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Satish Bodakuntla

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

This might sound like a 'cliché' answer but I remember enjoying every little progress made in the project, including some of the failed experiments. Every experiment brought us closer to getting the story into its current form and I think they all count as 'eureka' moments.

In general, I can never forget how excited I was about my first neuronal culture and watching the beautiful neuron structures under microscope.

"This might sound like a 'cliché' answer but I remember enjoying every little progress made in the project, including some of the failed experiment."

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

We believe our findings that tubulin polyglutamylation controls intracellular transport in neurons could easily be true in any other cell type or organisms, making it an interesting idea for researchers from different fields. Thus, we chose Journal of Cell Science because it is one of the well-known journals in biology that covers a broad range of research fields. Also, we appreciate the extra effort JCS takes to promote the research.

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

Dr Carsten Janke and Dr Maria M. Magiera, my PhD supervisors, have always been a great help and constant support throughout my project. In addition to their scientific guidance in the project, they have played a great role in shaping and improving my scientific thinking and attitudes. The timely and intellectually stimulating discussions and their constant encouragement have steered this

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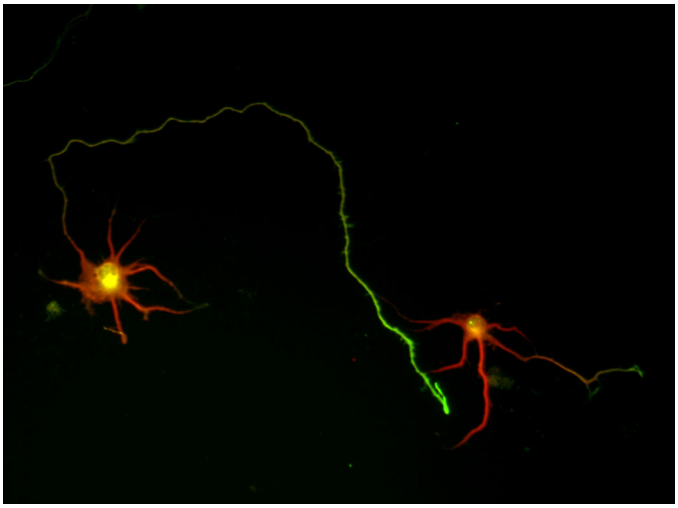

Cultured mouse hippocampal neurons stained with MAP2 (red) and Tau (green) antibodies.

project forward. I have also had great discussions with and received excellent feedback from my thesis committee members: Dr Filippo Del Bene, Dr Christian González-Billault and Dr Veronique Marthiens.

During my undergraduate days, I had great mentors like Dr Mayurika Lahiri, Dr Surojit Sural and Dr Mitali Tiwari, from whom I had learnt a great deal of science at a time when I did not even know how to use a pipette.

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 always been a curious person, always wanting to know new things and gain knowledge regardless of the subject, right from my school days. It was actually one of my college teachers, K.V.S.S. Ganesh, who helped me channel my inquisitiveness into science by encouraging me to ask questions and saying "Research will quench your thirst of curiosity".

Joining Dr Mayurika Lahiri's lab at IISER Pune, India during my undergraduate studies was definitely one of the right decisions that led me to where I am today. Research experience in her lab was intellectually stimulating and reinforced my drive to pursue my research interest, which led to joining Dr Carsten Janke's lab at Institut Curie, France.

Who are your role models in science? Why?

In my opinion, a role model is someone who inspires me to do great things in spite of very difficult circumstances. By this definition, I find my day-to-day motivation from people around me, those I meet or work with on a daily basis, who are in their own ways trying to make the best of the day.

In particular, I look up to my PhD supervisor, Dr Carsten Janke, as an individual as well as a researcher. As an aspiring independent researcher, I admire Carsten very much for the kind of science he does and how he does it, and for how well he mentors the young researchers of the lab. I thoroughly enjoy and am impressed by many enriching scientific, career and sometimes philosophical discussions I had with him. It was an excellent learning opportunity for me to have worked with Carsten during these initial years of my scientific career.

What's next for you?

I am currently in Dr Carsten Janke's lab to complete another publication. Meanwhile, I am looking for postdoc positions in the field of microtubules and neuronal cell biology.

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

I like playing cricket and watching movies. I took part in cricket tournaments during my graduate studies. Apart from watching movies, I have a keen interest in acting and screenplay. In fact, I acted in a few short films during my college days.

Reference

Bodakuntla, S., Schnitzler, A., Villablanca, C., Gonzalez-Billault, C., Bieche, I., Janke, C. and Magiera, M. M. (2020). Tubulin polyglutamylation is a general traffic-control mechanism in hippocampal neurons. *J. Cell Sci.* **133**, 241802. doi:10.1242/jcs.241802