

FIRST PERSON

First person – Marc Severin

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping researchers promote themselves alongside their papers. Marc Severin is first author on ‘Dynamic localization of the $\text{Na}^+\text{-HCO}_3^-$ co-transporter NBCn1 to the plasma membrane, centrosomes, spindle and primary cilia’, published in JCS. Marc is a PhD student in the lab of Stine Falsig Pedersen at Department of Cell Biology and Physiology, University of Copenhagen, Denmark, investigating the way cells live and interact with each other and their surroundings.

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

For cells to be happy and function optimally they are highly dependent on being able to regulate their acid–base balance. For this purpose, they have several proteins that can transport acid and base in and out of the cells. We studied one of these proteins (NBCn1), which transports bicarbonate into the cells, in turn helping the cells become more alkaline. At first, we were mainly interested in which parts of the protein are involved in its transport to the plasma membrane to carry out its function; we were able to identify key parts for this. Quickly, however, we became aware that NBCn1 also shows up in other parts of the cells that we did not expect, including in the cell division machinery and in the little antennae of cells known as primary cilia. We also found that depending on whether the cell is moving around or creating a tight epithelium with other cells, NBCn1 seems to directly interact with the proteins involved in these processes. All in all, it is surprising and exciting to see how many places this protein can be found, which opens up many new avenues of investigation!

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

When looking at NBCn1’s role in the cell cycle, imaging the localization was in some contexts quite ‘slippery’ to capture as it happens only during a very short time window. This was particularly true for the localization at centrosomes in non-mitotic cells. In the future, it would be interesting to look much closer at these localizations in finer spatio-temporal detail. Another challenge was that we had good indications that NBCn1 interacted with ciliary proteins but were unable to see this through the usual way of inducing growth arrest and ciliogenesis via serum depletion. In the end, we found that NBCn1 very clearly and consistently localized to primary cilia of polarized epithelial cells, which seems to be a prerequisite for this localization and is very interesting in terms of the interaction with polarity proteins like DLG1.

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

Most of all it was the realization that NBCn1 appears to be involved in so many different processes in distinct parts of the cell! Both during the different stages of the cell cycle and also involving cell



Marc Severin

motility and epithelial maturation. Although we had many early indications of such interactions, it wasn’t really until we were able to ascertain everything visually and confirm it from many different experimental angles that we could truly believe it.

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

Journal of Cell Science emphasizes and facilitates visual storytelling of high quality and we felt this matched our paper perfectly. Oftentimes the most inspiring papers for me are those with striking images either of data or with illustrations that perfectly tell a story by themselves.

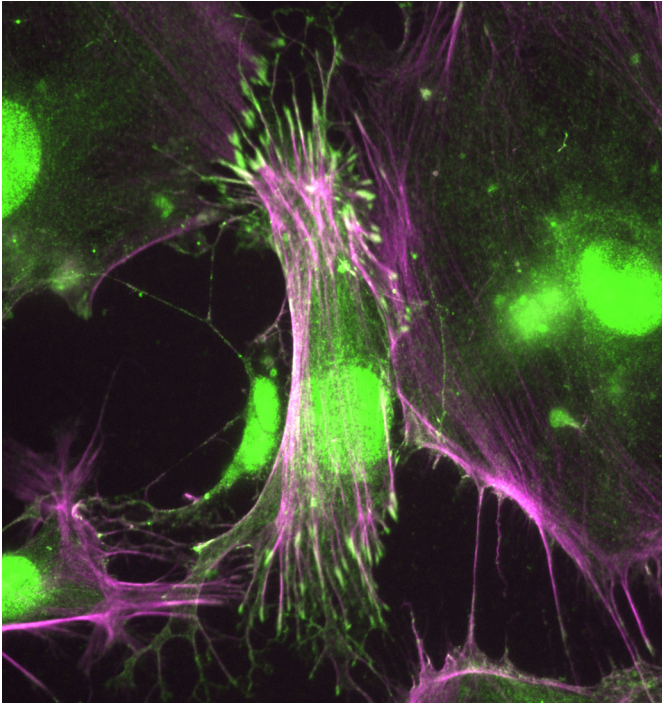
Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

We are fortunate in our lab to have a diverse group of kind and open people. Being able to talk to them as friends and colleagues with such different backgrounds from mine is always enriching, both in terms of specific scientific challenges and in a broader perspective.

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’ve always felt a close connection with nature and am fascinated by the wonders of the natural world. I have a background in photography and wanted to find a way to deepen my intellectual understanding of nature without letting go of my emotional connection. Thus, I chose to study biology and eventually became interested in biological imaging. However, I did not at all expect to end up in cell biology research, but quickly became fascinated with

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NBCn1 (green) seen at actin filament tips (purple) of primary mouse cortical neurons.

the secret lives of cells, and so it was all but impossible not to go further down that particular rabbit hole.

Who are your role models in science? Why?

I'm not sure I have role models, but outside of biology I have a soft spot for early 20th century physics in general and astrophysics in particular. The stories and discoveries are absolutely awe-inspiring!

What's next for you?

Working on another paper for my PhD!

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

I have a particular fondness for Japanese tea and might open a Japanese tea house at some point!

Reference

Severin, M., Pedersen, E. L., Borre, M. T., Axholm, I., Christiansen, F. B., Ponniah, M., Czaplinska, D., Larsen, T., Pardo, L. A. and Pedersen, S. F. (2023). Dynamic localization of the $\text{Na}^+\text{-HCO}_3^-$ co-transporter NBCn1 to the plasma membrane, centrosomes, spindle, and primary cilia. *J. Cell Sci.* **136**, jcs260687. doi:10.1242/jcs.260687