

FIRST PERSON

First person – Helena Sofia Domingues

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. Helena Sofia Domingues is first author on 'Pushing myelination – developmental regulation of myosin expression drives oligodendrocyte morphological differentiation', published in JCS. Helena Sofia conducted the research described in this article while a postdoctoral fellow in Inês Mendes Pinto's lab at the International Iberian Nanotechnology Laboratory (INL), Braga, Portugal. She is now a Junior Researcher in the lab of Fábio G. Teixeira at the Life and Health Sciences Research Institute (ICVS), University of Minho, Braga, Portugal, investigating mammalian myelination in development and age-associated neurodegeneration.

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

Oligodendrocytes are highly specialized cells of the central nervous system whose main function is to produce myelin, a fatty membrane sheet that is used to wrap around axons to provide insulation and metabolic support of neuronal networks. In order to produce the myelin sheet, oligodendrocytes must undergo drastic alterations in their morphology through modulation of their cytoskeleton. In this collaborative and multidisciplinary work, we added a mechanical perspective to the process of oligodendrocyte myelination. We characterized a family of specific molecules called myosins that operate as nanomotors on the oligodendrocyte cytoskeleton to modulate its architecture and dynamics. Given their different mechanochemical properties, we found that these myosins are expressed and function in a time- and space-specific manner to coordinate the myelination process. In particular, we provided strong evidence that these molecules may operate as modulators of mechanical plasticity by regulating cell tension and myelin membrane expansion at different cell stages of differentiation.

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

The preparation of article revisions in the middle of a global pandemic, across two continents and with co-authors who, like me, were at home with kids, was a challenge! But I believe we faced this period positively and were able to coordinate all tasks in a healthy team work environment.

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

The 'eureka' moment is, to my understanding, the sum of small daily 'eureka's and a reflection of active scientific discussions within the team. Myelination is one of the major achievements of vertebrates and is clearly associated with complex skills in the nervous system. While simple eukaryotes, such as fission yeast, have five myosins from three classes, humans display almost 40 myosins distributed over 18 classes. I believe that our 'eureka'



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moment happened when we hypothesized that the beauty of mammalian myelination could somehow be correlated with this amazing evolution of myosin diversity. In the context of developmental myelination in oligodendrocytes, this could contribute to the fine-tuning of the required morphological transformations. In our study, we focused on the spatio-temporal expression of the evolutionarily related myosins NM2A, NM2B, NM2C and Myo18a, how they differ in their mechanochemical properties and interactomes, and how this may be used to adjust oligodendrocyte mechanical plasticity in terms of cell tension and membrane expansion.

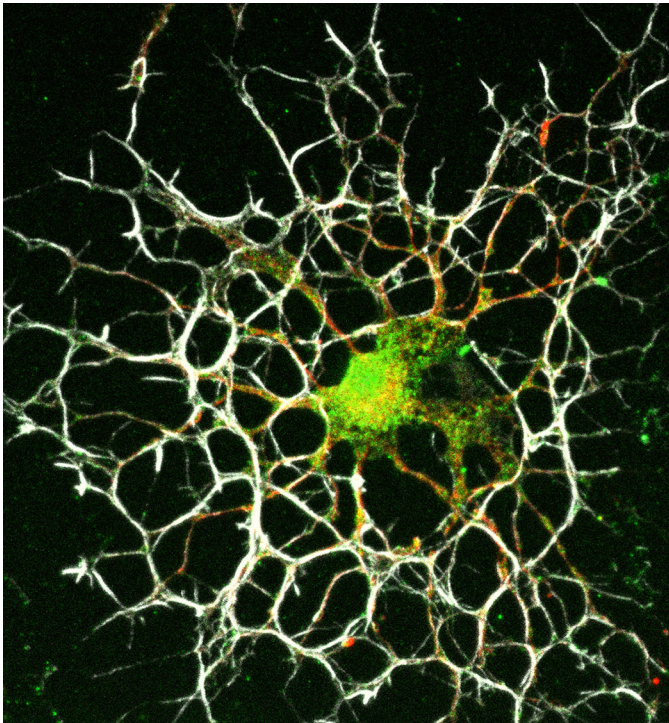
Why did you choose Journal of Cell Science for your paper?

Journal of Cell Science is a renowned journal from The Company of Biologists, and we felt confident that our study would reach the right audience both in the specialized glia field and general cell biology. Our manuscript submission and revision processes were extremely friendly and very constructive. I have no doubts in stating that Journal of Cell Science helped to improve our work.

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

Since my undergraduate training, I have had many lab supervisors and, somehow, all of them made important humane contributions in

Helena Sofia Domingues's contact details: Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho, 4710-057 Braga, Portugal. E-mail: Sofia.domingues@med-uminho.pt



Myosin-18a (green), tubulin (red) and actin (gray) immunostaining in mature oligodendrocytes. Image credit to Amr Almqaktari and Carmen Melendez-Vasquez, co-authors of the study.

shaping different stages of my professional path. It seems unfair for me to name just one or two. Hence, I would prefer to highlight the importance of external mentoring, which I believe may be equally relevant, as it happens in institutions' external advisory boards. I believe that it is extremely healthy that young researchers look for career development advice from more senior researchers outside their close working circle so they can receive more objective and unbiased mentoring. I am very grateful to Jonah R. Chan from the University of California San Francisco. Jonah is the scientist I admire the most in my research field, and I am very fortunate to have received his precious advice over the years.

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Who are your role models in science? Why?

I don't believe in role models but rather in the potential that each researcher, individually, can contribute to build a better scientific community. It can be locally by providing a good environment

inside the lab team, a thorough mentoring of young students or even fantastic social skills that organize the best Friday 'Happy Hours' in the research institute. More globally, there are those researchers who, with their diplomatic and political skills, fight for gender equality in science, for example. I am grateful to all of them.

What's next for you?

I truly don't know, I will let time tell me. I feel extremely motivated for biomedical sciences, and I very much enjoy working in academia. Here, we acquire many more competencies than we imagine. Yet, I am completely open to what the world may have to offer, I will be there to accept the challenge.

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

Talking about challenges, I love sailing. Undoubtedly, one of the things that sailing and scientific research have in common is the seeking of the unknown. I would like to share one of my favorite poems from the Portuguese author Miguel Torga, which nicely illustrates a scientific or sailing adventure:

The Journey

I ornamented the ship of illusion
And I reinforced the sailor's faith.
My dream was long, and treacherous
The sea...

(Only we are granted
This life
That we have;
And it is in it that it is necessary
To seek out
The old paradise
That we lost).

Ready, I let loose the sail
And bid farewell to the port, to the numbing peace.
Unmeasured,
The immense revolt
Transforms from day to day the vessel
In an errant and winged sculpture...
But I slice the waves without disheartening.
In any adventure
What matters is leaving, not arriving.

Reference

Domingues, H. S., Urbanski, M. M., Macedo-Ribeiro, S., Almqaktari, A., Irfan, A., Hernandez, Y., Wang, H., Relvas, J. B., Rubinstein, B., Melendez-Vasquez, C. V. et al. (2020). Pushing myelination – developmental regulation of myosin expression drives oligodendrocyte morphological differentiation. *J. Cell Sci.* **133**, jcs232264. doi:10.1242/jcs.232264