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FIRST PERSON

First person – Guillaume Hatte

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. Guillaume Hatte is the first author on 'Tight junctions negatively regulate mechanical forces applied to adherens junctions in vertebrate epithelial tissue', published in Journal of Cell Science. Guillaume completed his PhD in the lab of Claude Prigent at CNRS UMR 6290 and Université de Rennes 1, Rennes, France, where he investigated the involvement of tight junctions during epithelial cell cytokinesis in a vertebrate model.

Guillaume Hatte (image by Marion Laillé)

How would you explain the main findings of your paper to non-scientific family and friends?

When I explain my work to non-scientists, I tell them that I study cell division, which everyone remembers from their lessons in high school. To go into further detail, I explain that I work on the division of epithelial cells. Epithelial tissues line the surfaces of organs throughout our body. For example, the intestine is lined with a layer of epithelial cells. The integrity of this layer is important for many reasons, one being that it prevents the entry of pathogens into the body, and this integrity is ensured by the junctions that exist between the cells. A problem comes when we consider how these cells regenerate. How do they maintain their cohesion while they are undergoing division? That's what we address in our paper. We show that two protein components of these junctions, GEF-H1 and ZO-1, are essential for the success of the division.

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

The main challenge of this project was a technical one: how to test the hypothesis that the phenotypes we observed during division of GEF-H1- and ZO-1-depleted cells result from mechanical perturbations at the level of adherens junctions. We needed a way to monitor the effect of these proteins on tension *in vivo*. It was possible thanks to an ongoing collaboration with another team in our institute. We used their homemade Fast-FLIM microscope and a FRET biosensor that had already been characterized in epithelial cells in a previous study on which I am a co-author.

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

I was lucky enough to have two 'eureka' moments during my PhD work. For this paper, the first one was the result obtained with the tension biosensor: we observed that the depletion of GEF-H1 and ZO-1 increased the tension applied to adherens junctions. The second happened when, after testing several hypotheses, we made the link between the flattened form of the contractile acto-myosin ring during cytokinesis and the increase of tension at the level of adherens junctions in GEF-H1- and ZO-1-depleted embryos. This result shows the involvement of tight junctions in epithelial cell cytokinesis in a vertebrate for the first time.

Have you had any significant mentors, and how have they helped you?

My PhD supervisor Dr Jean-Pierre Tassan taught me the basics for the success of my thesis. He has always been present to discuss my project and always pushed me to follow my ideas to the end and test them.

"Enjoy every moment both inside and outside of the lab."

What's the most important piece of advice you would give first-year PhD students?

You have time! You have time to do your research. It's important to think and to understand what you are doing before embarking on experiments. You'll see that they will work a lot better like this. You also have time to share your research. Share by participating in international conferences, but also by getting involved with associations that promote outreach work, making the public more aware of research and helping to build a passion for science in children of all ages. And finally, you have the time to share good moments with the other PhD students in your area, and to relax. Enjoy every moment both inside and outside of the lab.

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

To simplify access to funding. By decreasing the number of grant applications that young scientists need to make, and increasing the amount of funding available, it would help people in their early careers to have a clearer vision of their more distant futures. They would have more time to advance their projects, hire post-doctoral and PhD students, and publish good papers. And most of all, less time would be spent filling out calls for tenders. I also think that it's important to have a mentor who can help in all aspects of research. A good mentor can use their experiences to guide a young researcher and facilitate their integration.

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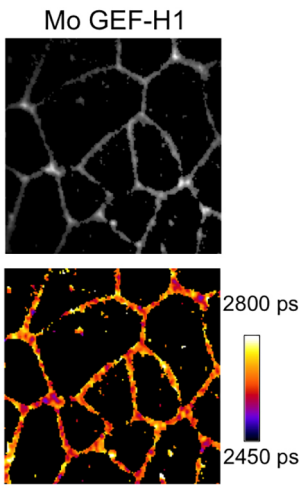

Tensile forces applied to adherens junctions (top) and the corresponding fluorescence lifetimes (bottom)

What's next for you?

I defended my PhD in March 2017. Now, I am taking a training course to improve my skills in informatics. In parallel, I am looking for a post-doctoral position. I want to use my knowledge in live cell imaging to explore new biological issues and to further build my skills in microscopy and image analysis.

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

During my PhD, I started spearfishing. I was able to enjoy the underwater flora and fauna while fishing for fish and shellfish. It's a great way to unwind, totally away from the lab, during the hard times of the PhD. The French coast is beautiful. I am lucky to live close to the sea, not far from renowned attractions like Saint Malo, an old corsair city, and the UNESCO site Mont Saint-Michel.

Reference

Hatte, G., Prigent, C. and Tassan, J.-P. (2018). Tight junctions negatively regulate mechanical forces applied to adherens junctions in vertebrate epithelial tissue. *J. Cell Sci.* **131**, jcs208736.