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FIRST PERSON

First person – Kamilla Laidlaw

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. Kamilla Laidlaw is first author on 'A glucose-starvation response governs endocytic trafficking and eisosomal retention of surface cargoes in budding yeast', published in JCS. Kamilla is a Postdoc in the lab of Chris MacDonald at University of York, UK, investigating the regulation of surface proteins through endosomal trafficking mechanisms.

Kamilla Laidlaw

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

The surface of biological cells is packed with lots of different types of proteins, which perform important functions, such as up taking of nutrients or responding to hormone signals from outside the cell. However, in response to starvation conditions, many of these proteins are directed inside the cell. This mechanism conserves energy by reducing activity of surface proteins whilst also producing a supply of useful products following their degradation inside the cell. Just like human cells, yeast cells downregulate surface proteins in response to starvation. To understand the machinery of this process, we took advantage of this overlap to allow us to probe for the proteins responsible. We used various methods, including microscopy, to identify the responsible factors for the movement of these surface proteins. We found that key factors are synthesized at a higher rate during starvation and go on to show they are responsible for the movement of surface proteins to the inside of the cell for degradation. We show that, during glucose starvation, a small portion of the surface proteins are protected from this removal from the surface in small membrane indentations or pockets of the surface itself, which act as safe havens to protect surface proteins from being delivered into the cell. This protection from removal provides the cell with an advantage when no longer under starvation conditions, allowing for improved growth coming out of a period of starvation.

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

To study the movement of surface proteins during starvation, requires two things; live-cell time-lapse microscopy and microfluidics, which allows us to control the cell environment. We are only getting started as a group and are navigating setting up these new techniques in a new environment. Overcoming these challenges was greatly facilitated by the excellent centralized technology facility at the University of York. Our work was also interrupted with an extended lockdown due to the Covid-19 pandemic. Of course, the entire world experienced this challenge together.

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

Our finding that the glucose-sensing repressor Mig1 regulates membrane trafficking events was our original interesting finding. Results from qPCR showing the involvement of the AP180 adaptors, regulated by Mig1 repression and increasing during glucose starvation conditions, led us to further probing of these factors, which showed their capability in driving this internalisation function important to the glucose starvation response.

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

Journal of Cell Science was one of the first journals we discussed as a suitable home for this paper. The launch of FocalPlane by JCS and the large amount of microscopy techniques, such as slim-field and airyscan super resolution, shown within this paper made JCS a complementary journal for these findings. We hope this strong commitment to microscopy science would make our paper of interest to the JCS readership. This paper is the first publication from my postdoc as well as ours as the MacDonald group. We felt that JCS would provide us with a platform to circulate our findings.

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

Beyond routine local mentorship with principle investigators in the labs, I was lucky enough to carry out my PhD in the same lab as Dr Ian Salt (Senior Lecturer at the University of Glasgow). Over the years, Ian has supplied candid insight into the workings of academic research institutes helping me (and others) gain a realistic insight into the academic process. More recently, he was the catalyst organizing regular zoom catch ups during the Covid-19 pandemic bringing together past colleagues at various stages of our careers, which formed, for me, an unofficial support network during a particularly stressful time.

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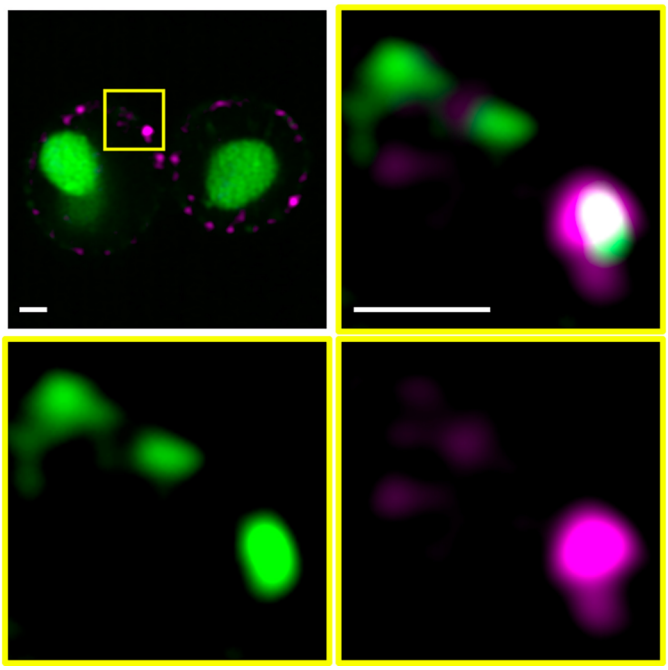

Cells expressing Mup1–GFP and Yap1802–mCherry after 120 min of glucose starvation, zoomed in on the surface.

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?

Initially I pursued a degree in veterinary medicine, but, after two years, I realized my interests lay with the mechanisms of cellular biology behind medicine and made the choice to transfer to biochemistry. It was during my undergraduate degree that it became clear to me that I enjoyed the challenge and interest a research lab provides; this transition resulted in a feeling of needing to catch up to my peers and led me to taking advantage of various short placements in a variety of research institutes. It was during my final year that I identified my interest in compartmentalization of the cell surface and the regulation of proteins at the surface via trafficking events. When it was suggested to me that I look into PhD opportunities, it was a surprise to me the opportunities out there and that I would be paid to study something I enjoyed! This led me to participate in scientific outreach programs, such as the Edinburgh Science Festival, during my time of PhD study, in particular working with school children on publicizing the opportunities available to them within the scientific community to come and join us. The choice of following the route to postdoc was the natural next step and has led to my growth as a scientist, exceeding what I could have considered possible as a student. Ultimately being open to and embracing change led me to my current career in science.

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What's next for you?

I still have time left as a postdoc to consider my next steps. I can't be too sure what will be next, but I hope that there will be opportunity to extend my current research endeavour and further investigate new questions we generate from our findings.

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

According to my mum, when I was born, I was the same length as the longest baby at that time, a whopping 62 cm long! I have kept up being tall and now spend my time in the lab putting things out of reach – according to my colleagues.

Reference

Laidlaw, K. M. E., Bisinski, D. D., Shashkova, S., Paine, K. M., Veillon, M. A., Leake, M. C. and MacDonald, C. (2021). A glucose-starvation response governs endocytic trafficking and eisosomal retention of surface cargoes in budding yeast. *J. Cell Sci.* **134**, jcs257733. doi:10.1242/jcs.257733