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FIRST PERSON

First person – Timothy Cummins

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. Timothy Cummins is the first author on 'PAWS1 controls cytoskeletal dynamics and cell migration through association with the SH3 adaptor CD2AP', published in Journal of Cell Science. Timothy is an Assistant Professor of Medicine at the University of Louisville School of Medicine Clinical Proteomics Center, which focuses on identifying biomarkers of kidney diseases by using quantitative mass spectroscopy.

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

In this work, we found a new protein FAM83G (also known as PAWS1) that is involved in regulating the ability of cancer cells to migrate and change the shape of the cellular skeleton. The mechanisms of cell migration are crucial for many cell biological processes during development and normal tissue growth and maintenance. Cancer cells can usurp normal cell processes and make them hyperactive, which leads to inappropriate cell migration that can contribute to metastases. Our findings indicate a crucial role for PAWS1 in cell migration.

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

The main challenge of this project was to uncover the role of the novel PAWS1 protein, and a few clues could be gleaned from its sequence. After conducting protein-protein interaction studies and sifting through proteomics data, we identified CD2AP as one of the top interactors, leading us to investigate possible roles in actin and cytoskeletal organization and dynamics. When we knocked out PAWS1 by using CRISPR/Cas9 (which was not yet available at the start of this project), the observed impact of PAWS1 loss on cell migration and morphology quickly validated our working model.

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

With the successful application of CRISPR/Cas9 to knockout PAWS1 in cells, we immediately knew that it must regulate cell migration and that this could very well be through its effects on actin dynamics. Soon, the connection between CD2AP and FAM83G made more sense. Cells lacking PAWS1 clearly had a defect in the ability to adhere and form productive focal adhesions to promote cell locomotion. The second 'eureka' moment arrived when we knocked out CD2AP, as both CD2AP and PAWS1 knockout cells showed similar phenotypes, indicating these proteins interact and are synergistically involved in actin dynamics.

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

I entered the realm of scientific research after I met Professor Bill Dean and he allowed me to join his lab as an undergraduate; this is where I began learning how a biochemist dissects cellular questions from a protein structure/function perspective. This experience intrigued me and propelled me toward a career in biochemistry. Other mentors, such as Dave Powell, Brad Hill and Gopal Sapkota, allowed me to further develop my skills in physiology, biochemistry and cell biology, to have a well-rounded background. Each of these mentors helped me immensely at different phases of my scientific training.

Timothy Cummins's contact details: Division of Nephrology and Hypertension, Clinical Proteomics Center, Department of Medicine, University of Louisville, Louisville, KY 40202, USA.
E-mail: timc@woodhudson.org

Timothy Cummins

"…remember to always seek out advice and even criticism."

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

As a PhD student, you will have lots of freedom to attack an important question, but remember to always seek out advice and even criticism. Constructive criticism will be useful throughout your career as this is essentially what any good peer-review entails. Learning to address criticism, and strengthen your approach and argument for or against any hypothesis will make you a better scientist.

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

Early-career scientists need to explore a variety of career options and get exposure in academic and non-academic areas. Formal programs

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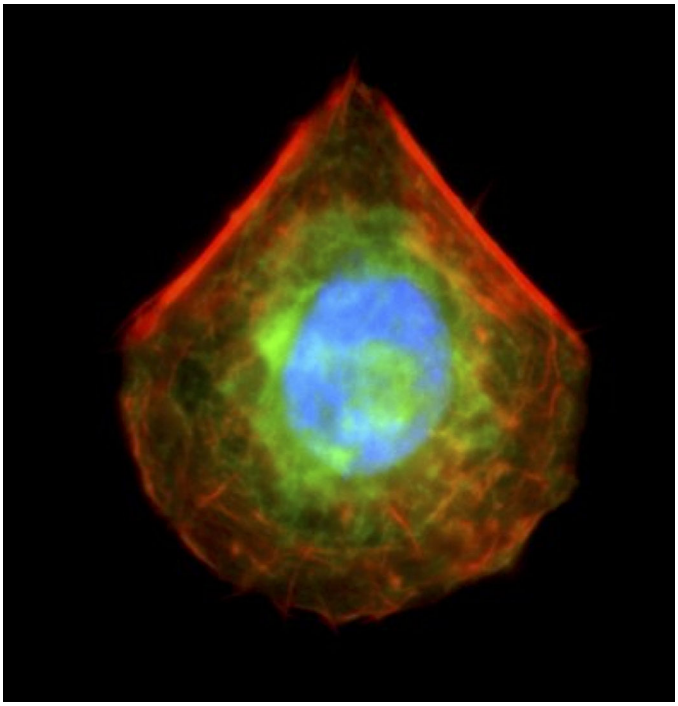

Crossbow micropattern image of U2OS cells. Actin-mApple-LifeAct (red), GFP-cortactin (green) and DAPI (blue).

need to be established to help guide PhD students in the earliest phases of training towards productive career paths aside from the traditional academic professorship.

What's next for you?

I have moved on to a faculty position as an Assistant Professor in the Department of Medicine at the University of Louisville.

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

Outside of the lab, I enjoy riding my mountain bike, and kayaking the rivers and lakes in Kentucky.

Reference

Cummins, T. D., Wu, K. Z. L., Bozatzi, P., Dingwell, K. S., Macartney, T. J., Wood, N. T., Varghes, J., Gourlay, R., Campbell, D. G., Prescott, A. et al. (2018). PAWS1 controls cytoskeletal dynamics and cell migration through association with the SH3 adaptor CD2AP. *J. Cell Sci.* **131**, jcs202390.