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FIRST PERSON

First person – Georgi Dimchev

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. Georgi Dimchev is first author on 'Lamellipodin tunes cell migration by stabilizing protrusions and promoting adhesion formation', published in JCS. Georgi conducted the research described in this article while a post-doc in Prof. Klemens Rottner's lab at Division of Molecular Cell Biology, Zoological Institute, Technische Universität Braunschweig, Braunschweig, Germany. He is now a Post-doc in the lab of Florian Schur at IST Austria, Klosterneuburg, Austria, he is interested in uncovering the specific activities of cytoskeleton-associated proteins *in situ*.

Georgi Dimchev

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

One of the steps necessary for cell migration to occur is the extension or protrusion of the cell edge. It is known that the protein lamellipodin (Lpd) is a positive regulator of cell migration and cell edge protrusion, but through a combination of gene-deletion and sophisticated computer-assisted analysis, we managed to dissect cell edge movement into its subcomponents, and to demonstrate for the first time how Lpd functions in stabilizing protrusive structures by counteracting their fluctuations and retractions. Our work not only supports and reveals important aspects of how cell motility and cell edge protrusion and maintenance are regulated, but also highlights how traditional cell biology and computer-assisted analysis methods can be combined in order to unravel new layers of complexity in the regulation of cell migration and behaviour.

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

One of the challenges we faced was how to quantify the cell edge/lamellipodium fluctuation phenotypes we observed, as this required expertise we did not have in our group at the time. Establishing collaborations with physicists from the Max-Delbrück center in Berlin (Behnam Amiri and Prof. Martin Falcke) allowed us to develop a MATLAB-based workflow, which revealed very interesting observations of previously unknown regulatory functions of our protein of interest (Lpd); this then opened many other avenues to explore. Challenges can sometimes be healthy for a project: they may act as a reason to stop, reflect and refocus on aspects which you did not previously think would be of significance. They are also always a good reason to look beyond your comfort zone and seek to establish new collaborations.

"Challenges can sometimes be healthy for a project: they may act as a reason to stop, reflect and refocus…"

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

I had a few mini 'eureka' moments during this project. One of them was triggered shortly after a brief conversation I had with Gregory Giannone, who was visiting our institute at the time when I was trying to find out how the fluctuation phenotype we observed in our Lpd-knockout cells was mediated. We had a discussion on adhesions, and I realized that I had previously been entirely focusing on focal adhesions, while overlooking potential phenotypes on nascent adhesions. In the following days, I overexpressed EGFP–paxilin in my cells, made time-lapse movies and focused on visualizing and quantifying adhesions towards the very tip of the lamellipodium, to discover that there was a clear correlation between observed fluctuation patterns and the distribution of nascent adhesions in the front or back parts of the lamellipodium. Finding previously unexplored correlations are the 'eureka' moments I enjoy most and, for me, most often they are preceded by discussing projects with another colleague.

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

JCS is a very strong and very well-read journal with a broad scientific audience, and I believe our story will be interesting for many of its readers.

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

I was very lucky to have had supervisors who early on taught me one of the most important lessons in science: "Failures are part of the scientific journey, experiments will often not work and you will often be wrong, so focus on your long-term goals, keep trying new

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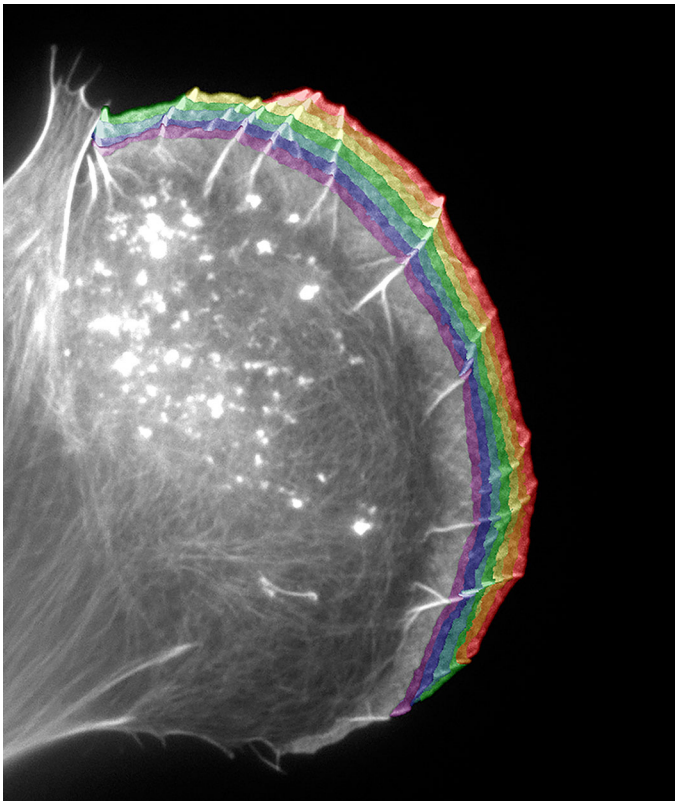

Illustration of cell edge advancement of a protruding B16-F1 mouse melanoma cell, with each colour at the front representing a different time frame.

things and never be afraid to ask others for advice." Over time, several people have helped me develop my resilience as a researcher. My first baby steps in science, as an intern, were in the group of Prof. Stefan Linder in the LMU (Munich) who gave me the encouragement I needed in order to have a positive start as a scientist. Dr Steven Kernie at the UT Southwestern Medical Center in Dallas, who was my bachelor's thesis supervisor, one of the nicest and most generous people I ever met, funded me and welcomed me as an inexperienced intern in his group for 6 months and encouraged me to start thinking independently as a researcher. Prof. Claire Stewart and Dr Nasser Al-Shanti, my PhD supervisors at Manchester Metropolitan University, offered me the opportunity to design my own PhD project, to perform the research I was excited about and gave me the freedom to make mistakes and try new things. As a post-doc in the group of Prof. Klemens Rottner at the Technical University of Braunschweig, I knew that I could always call Klemens any time of the day or night, and could always get useful feedback on any problem I encountered. I am currently doing a second post-doc in the group of Prof. Florian Schur at the IST Austria, which is one of the most enjoyable experiences in my career so far, as I feel that I am given the support and freedom to grow into complete independence as a researcher.

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?

When I was a kid, my father used to bring home different encyclopedias on various topics, because he thought that, apart from playing football and computer games with friends, it would be nice if I spent more time on reading. I must be honest that most of these encyclopedias often ended up as goal posts in my room and I did not really read them. But once he brought this really big medical encyclopedia with great illustrations of different body systems, cells and organelles, and I remember that I was completely obsessed with it. I was just fascinated by the concept that something so small as a cell can be so highly organized and that virtually any pathological condition can be tracked down to the cellular or molecular scale. I never thought twice what I wanted to study at university. I had many interesting scientific moments since then, but what excites me most is learning new things – I have been working on projects in neurogenesis, bone regeneration, stem cells, skeletal muscle homeostasis, cell migration and cytoskeleton regulation, now I am learning cryo-ET techniques and downstream post-processing, and this for me is the best thing in science: it never gets boring, because there are so many new things to discover and to keep you motivated!

What's next for you?

I am currently working on my second post-doc project at the IST Austria, which I plan to complete mid-2021. I love science and I am considering applying for independent positions in academia, but I also find quite attractive the collaborative environment and application-oriented work that you can perform in industry, an interesting challenge as well.

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

I enjoy spending time with my family after work. I figured out that having a scientific career and family can function surprisingly well together and that having kids can really help you optimize your time much more efficiently.

Where do you see your scientific field in mid- to long-term future?

I think that scientific progress in future would greatly benefit from multidisciplinary projects and the bench work will gradually be automated, while PhDs and post-docs would spend significantly more time working on collaborative projects and sitting in front of the computer, creating, modifying or optimizing scripts or computational workflows to extract the most of their data and reveal hidden layers behind it. I find particularly exciting how the concept of investigating processes or effects of molecular targets via multimodal approaches and across different scales will develop in future. For instance, combining improved CRISPR/Cas9-applications, advanced light microscopy, cryo-electron tomography approaches with further development and mainstream application of neuronal networks and deep learning approaches to facilitate data analysis will likely enable scientists to shift from asking "how does this protein affect this structure or function" towards "how does this group of proteins together or in a redundant fashion affect multiple cellular organelles and systems, and how do they influence each other's function in various physiological contexts".

Reference

Dimchev, G., Amiri, B., Humphries, A. C., Schaks, M., Dimchev, V., Stradal, T. E. B., Faix, J., Krause, M., Way, M., Falcke, M. et al. (2020). Lamellipodin tunes cell migration by stabilizing protrusions and promoting adhesion formation. *J. Cell. Sci.* **133**, 239020. doi:10.1242/jcs.239020