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. Fanny Jaudon and Martina Albini are co-first authors on ‘A developmental stage- and Kidins220-dependent switch in astrocyte responsiveness to brain-derived neurotrophic factor’, published in JCS. Fanny is a postdoc at the University of Trieste in the lab of Lorenzo A. Cingolani at Center for Synaptic Neuroscience and Technology, Istituto Italiano di Tecnologia, Genova, Italy, investigating the molecular mechanisms controlling development and function of neuronal circuits and implementing genome-editing approaches for the treatment of neurological disorders. Martina is a PhD student at the Istituto Italiano di Tecnologia in the lab of Fabio Benfenati and Fabrizia Cesca investigating neurotrophin biology and its involvement in neurological diseases.

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

F.J.: Neurotrophins such as NGF or BDNF are growth factors that regulate the survival, development and function of the brain. While their effects on neurons have been extensively studied, it is becoming increasingly clear that they also act on astrocytes, but their role in this cell type remains poorly characterized. In this work, we investigated how astrocytes respond to BDNF stimulation and analyzed the role of the protein Kidins220 in this response. Indeed, Kidins220 is a scaffold protein that mediates neurotrophin signaling in neurons and is also expressed in astrocytes, where it regulates calcium signaling and neuron–astrocyte communication. We showed that the astrocyte responsiveness to BDNF depends on the developmental stage of the cultures and on the presence of Kidins220.

M.A.: Astrocytes are no longer purely viewed as support cells for neurons, and it is now clear that they play active roles modulating neuronal activity. In this paper, we compared the signaling competence of embryonic and postnatal primary cortical astrocytes and identified a developmental stage- and Kidins220-dependent switch in astrocyte responsiveness to BDNF. Our data contribute to the understanding of the complex role played by astrocytes within the central nervous system, and identify Kidins220 as a novel actor in the increasing number of pathologies characterized by astrocytic dysfunctions.

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

F.J.: The experiments on BDNF signaling in astrocytes were one of the first things I started when I joined Fabrizia Cesca’s group, but it took a long time before the completion of the project, and I had moved to another group by then. Fortunately, Martina joined the lab...
soon after and she took over the experiments. While in another group, I was still working in the same institute for a while, so I could easily follow the advancement of the project and help with the experiments in my free time. I eventually moved to Trieste but managed to keep being involved via Skype meetings.

M.A.: My supervisor was working in a different city and although we had regular meetings, it was sometimes difficult to plan and troubleshoot my experiments on my own. Also, as a PhD student who has a limited amount of time to conduct experiments, the coronavirus pandemic was a big challenge. This has, however, allowed me to become more independent and develop skills to bring the project forward.

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

F.J.: When we started the project, we worked only on embryonic astrocyte cultures. BDNF was known to evoke calcium transients in astrocytes, so we wanted to see whether Kidins220 was involved in this process. Despite all our efforts, we did not manage to elicit a robust response in our embryonic wild-type cultures and I was convinced that this would never work. We then started to work on postnatal cultures and at the end of one day of recording we decided to give the BDNF stimulation another shot on the last coverslip we had. Surprisingly, we observed for the first time a strong BDNF-evoked calcium transient! We then repeated this the following days and it became clear that the developmental stage of the culture was a determinant in the BDNF response.

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

M.A.: We were looking for a journal with a good reputation, publishing high quality studies in the field of cell biology and neuroscience. Journal of Cell Science was the perfect fit!

What’s next for you? (If you are planning on leaving academia, please tell us why!)

F.J.: I will be working at the University of Trieste for the next two years. Then, I plan to go back to France and apply for a permanent researcher position at the CNRS and eventually start my own group.

M.A.: I will be finishing my PhD in the next few months; I then plan to apply for a postdoc position and continue my career in academia.

Reference

Confocal images of untreated and BDNF-treated wild-type embryonic astrocytes. Cells were stained with anti-pTrkB (Tyr516, green) and anti-GFAP (red) antibodies, and with Hoechst to visualize nuclei.