The Company of Biologists

First person – Lotte Vanheer

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. Lotte Vanheer is first author on 'Tox4 modulates cell fate reprogramming', published in JCS. Lotte is a PhD student in the lab of Vincent Pasque at the Department of Development and Regeneration, University of Leuven, Belgium, investigating how transcription factors and chromatin modifications are able to modulate cell identity.

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

Induced pluripotent stem cells (iPSCs) are a type of stem cell that can specialize into all cell types of the body. These iPSCs can be generated at a very low efficiency by reprogramming specialized adult cells. However, it remains largely unclear how these specialized cells transition into iPSCs. In this paper, we identified a protein called TOX4 that changes how specialized cells become iPSCs. We found that TOX4 helps cells to 'forget' their specialized cell identity in favor of acquiring an iPSC-specific cell identity, making efficient reprogramming possible. TOX4 also influences how specialized cells become induced neurons, suggesting that TOX4 has a more general role in cell fate transitions. These findings about how cell identity is controlled can be relevant for regenerative medicine, human disorders and cancer therapy.

Lotte Vanheer

TOX4 (green) and DAPI (blue) staining in mouse embryonic fibroblasts, confirming the somatic expression of TOX4.

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

This project will stick with me since it was my first project during my PhD. The most exciting moment during this project was the first time I tried to differentiate mouse embryonic fibroblasts into induced neurons. In our lab, we had no prior previous experience with this protocol and it was very exciting to see clearly defined induced neurons during the first attempt!

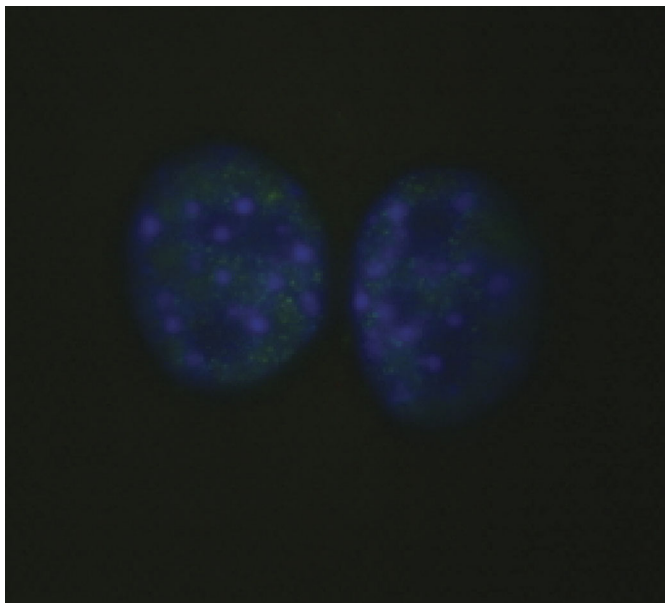### Why did you choose Journal of Cell Science for your paper?

We chose Journal of Cell Science because it publishes high-quality articles in a broad range of cell biology related topics. In Journal of Cell Science, we hoped to be able to communicate our findings with a wide audience of scientists.

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

Prof. Vincent Pasque is my mentor during this early stage of my PhD. He taught me how to be an independent and more confident scientist and how to analyze experimental data and publications critically. He also allowed me to pursue my own research interests which helped me develop as a scientist.

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?

As a child, I always wanted to know how the world around me worked. I spent hours reading science books throughout my

childhood, and I remember being amazed how the human body could actually function properly with its trillions of cells! This interest made me choose Biomedical Sciences as my Bachelor and Master Degree. After a summer internship at Vincent Pasque's lab, I decided to start a PhD in stem cell research in order to contribute to clinically relevant scientific research.

What's next for you?

I am currently starting the second year of PhD. My next project will focus on how histone modifications impact the differentiation of human iPSCs towards the pancreatic β cell fate.

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

I like to go scuba diving whenever I have some free time. Being underwater is a great way for me to relax and unwind.

Reference

Vanheer, L., Song, J., De Geest, N., Janiszewski, A., Talon, I., Provenzano, C., Oh, T., Chappell, J. and Pasque, V. (2019). Tox4 modulates cell fate reprogramming. *J. Cell Sci.* **132**, jcs232223. doi:10.1242/jcs.232223