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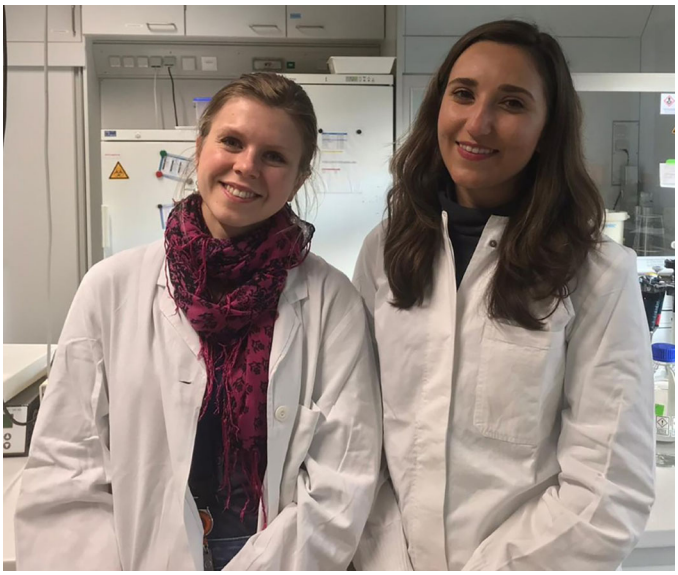
First person – Agnieszka Bauer and Julia Cecilia Madela

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. Agnieszka Bauer and Julia Cecilia Madela are first authors on 'Rat cytomegalovirus-encoded γ-chemokine vXCL1 is a highly adapted, species-specific agonist for rat XCR1-positive dendritic cells', published in JCS. Agnieszka is a postdoc, and Julia a Research Associate in the lab of Sebastian Voigt at Robert Koch Institute, Berlin, Germany, where they investigate host–pathogen interaction and viral immune evasion.



Agnieszka Bauer (left) and Julia Cecilia Madela (right)

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

A.B.: Viruses have developed mechanisms to evade the immune response of their host. In the case of herpes viruses, e.g. Cytomegalovirus, this leads to long-lasting infection. These viruses adapted so-called chemokines from their hosts, which normally play a crucial role in organization of immune cells during infection. However, this viral chemokine copy confuses or misleads cells of the immune system by disrupting the naturally ongoing communication between immune cells during infection to eliminate invaders. Rat cytomegalovirus encodes the viral chemokine vXCL1, which interacts with dendritic cells through attracting them. These cells have the suitable receptor XCR1 on their surface. Moreover, binding of vXCL1 to XCR1 is much more intense than the binding of the host XCL1. Hence, it is of great interest to discover why the virus targets $XCR1^{+}$ dendritic cells. This cell population has been shown to have a special function during immune response by picking up foreign material and activating cytotoxic T cells that are able to clear virus infected cells.

J.C.M.: My family often imagines my work to be really adventurous. Then I take them back to reality. I show them that viruses can be very ingenious by running away from the immune system. Once infected with herpes, you will carry the virus for life. Viruses such as cytomegalovirus have stolen a lot of genes from their host and used them to manipulate the crosstalk between immune cells. XCL1 is the only known γ-chemokine, and the rat cytomegalovirus is the only known virus coding for an analog. This is surprising because XCL1 attracts a high potential cell population called dendritic cells. These cells are able to induce an antigen-specific immune response. With recombinant chemokines, we were able to show that both host and viral XCL1 activate XCR1, a receptor expressed on dendritic cells. We were able to show that the viral chemokine is species specific and an even stronger agonist than the host XCL1. We assume that rat cytomegalovirus creates a beneficial situation for itself by attracting dendritic cells and altering their surface appearance.

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

A.B.: Working with primary cells, especially a rare cell population, such as dendritic cells, is really challenging. Here, the cell number is always the limiting factor. Before performing the main experiment enrichment is necessary and requires precise performance and patience.

J.C.M.: The isolation of dendritic cells from the spleen is a time-consuming process that takes 5 h. Owing to this, analytical experiments like the chemotaxis assay can take more than 20 h. Those experiments needed to be prepared and performed precisely. Most of these experiments were performed by two scientists working in shifts.

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

A.B.: During my doctoral project, the moment when I observed that XCR1 cell surface expression on dendritic cells is reduced after prolonged incubation with recombinant vXCL1 was most amazing to me. The fact that viruses manipulate their host's immune response by directly interacting with specific cell populations reminded me just how fascinating biology is. My focus on the interplay between host and pathogen in this project gives me insight into how complex and unexplored these interactions still are. Although a lot of work has been done in this field, there are still many unanswered questions concerning how the immune system and pathogens compete with each other.

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

A.B.: To publish in the special issue 'Cell Biology of the Immune System' was a great opportunity to make our findings more visible. Hence, JCS is an ideal journal to publish our data in and share it with other scientists.

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

A.B.: I really appreciated Stephanie Gurka's supervision. She taught and introduced me to flow cytometry analysis and single-cell

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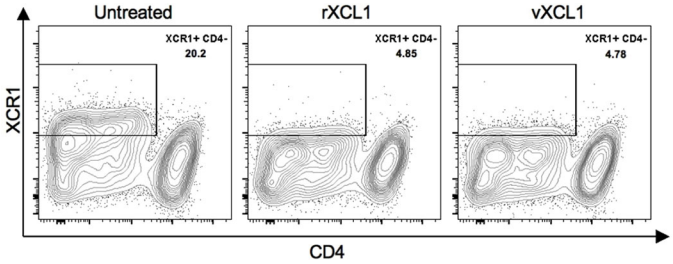

Flow cytometry data from OX62-enriched splenic rat dendritic cells. XCR1 cell surface expression on XCR1$^+$ CD4− dendritic cells is reduced after incubation with recombinant host (rat XCL1) or viral (vXCL1) chemokine.

preparation from tissues. Her guidance throughout my work was essential and she gave me valuable input and inspiration as well as critical discussion of my own data. At some point, I will hopefully be as helpful and supportive to one of my students as she was to me.

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?

A.B.: To explore something that nobody has investigated before in a specialized field is a major factor of my motivation. The fascination in biological processes and how life functions on the molecular level has intrigued me since high school. Since my studies at the Max Planck Institute of terrestrial microbiology in Marburg, my first experiences in scientific research made me want to work on a project in the field that I have now been working in for quite some time. Although there were many difficult moments, scientific research taught me endless patience.

J.C.M.: I was always curious about biology, especially infectious diseases. That's why I decided to embark on an academic career in the field of biology. Since my bachelor thesis, I have been working on infectious pathogens and the interaction with the host. To be honest, I was always more interested in the host signaling than in the pathogen itself. What is happening in an infected cell and how the leukocytes interact with each other has made me even more curious about infectious diseases.

Who are your role models in science? Why?

A.B.: Marie Curie and Jane Goodall are important role models to me. On the one hand, they were pioneers in their field and contributed a lot to science in general. On the other hand, their work has the power to inspire women to become scientists and strive for more acknowledgement and visibility in their respective field.

What's next for you?

A.B.: Teaching students as a postdoc at the Robert Koch Institute, and unravelling mechanisms of viruses and their interaction with their host's immune system are the next steps in my scientific career. However, working conditions in academia are challenging, with the fixed-term contracts and limited research funds.

J.C.M.: I am planning to finish my doctoral thesis in the next few months. Working with motivated and ambitious young scientists is something I never want to miss in the future. During my work in our self-organized graduate school at the Robert Koch Institute called RoKoDoKo, I recognized how important the young scientist community is. That's why I want to stay in research to further encourage this community and to share my experience and knowledge with them.

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

A.B.: Nature and its preservation are a topic that is especially close to my heart. It is a matter of rapidly increasing urgency, and I try to contribute as much as I can.

J.C.M.: I love traveling to foreign countries, to experience the culture and meet people with different backgrounds. When I was in Australia last year I was so excited by the birds that I thought if I had been born there I would have become an ornithologist. Then I came back to lab and was glad to be a molecular biologist.

Reference

Bauer, A., Madela, J., Berg, C., Daugvilaite, V., Gurka, S., Mages, H. W., Kroczek, R. A., Rosenkilde, M. M. and Voigt, S. (2020). Rat cytomegalovirus-encoded γ-chemokine vXCL1 is a highly adapted, species-specific agonist for rat XCR1-positive dendritic cells. *J. Cell Sci.* **133**, 236190. doi:10.1242/jcs.236190