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First person – Matthias Klose

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. Matthias Klose is first author on 'FIB-SEM-based analysis of *Borrelia* intracellular processing by human macrophages', published in JCS. Matthias is a postdoc in the lab of Professor Stefan Linder at Institute for Medical Microbiology, Virology and Hygiene, University Medical Center Eppendorf, Hamburg, Germany, investigating mechanisms that drive uptake and intracellular processing of *Borrelia burgdorferi* in primary human macrophages.

Matthias Klose

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

One part of our group is investigating regulators that drive compaction and intracellular processing of the bacterium *Borrelia burgdorferi*, the causative agent of Lyme's disease, in primary human macrophages. These spirochetes are actively internalized by macrophages into compartments called phagosomes. Here, we could see for the first time, with the high-resolution FIB-SEM tomography technique, *Borrelia*-containing invaginations that extend deeper into the host cytoplasm than the actual phagosome. Since borreliae are highly motile and can reach high velocities even in tissues, we hypothesize that these long invaginations are a phenomenon caused by extrication of the bacteria, as a desperate attempt to escape, if you will. Furthermore, we could show membrane tubulations, originating from phagosomes, with this technique, which probably reflect a mechanism for compaction of phagosomes, by getting rid of phagosome surface material. This was already infrequently visible in prior live-cell imaging studies from our group, but our paper now shows that it is a really widespread phenomenon, indicating that this is a general mechanism. Along with that, we found functional contacts of the endoplasmic reticulum (ER) at sites of invaginations and phagosomes, which both supports previous published work but also indicates that ER-dependent Ca^{2+} signaling plays a role in intracellular processing of borreliae.

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

A specific challenge has been finding a marker for endomembranes that is suitable for our infection model and for reliably visualizing tunnel formation. Luckily, Sergio Grinstein's work (he was the source of the reporter construct we used) is always worth a look.

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

Actually, it has been a general scientific 'eureka' moment. When I was a PhD student, right at the beginning, I did my first steps at the spinning disc confocal microscope. The first moments when I imaged live cells interacting with bacteria again and again, seeing fluorescent vesicles running throughout the whole cell… this has been pretty exciting to me.

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

Our lab is mainly focused on cell biology and has published many times in JCS before, always experiencing fair and constructive comments. Also, the upcoming special issue about the cell biology of host–pathogen interactions perfectly fits the scope of our manuscript and the *Borrelia* infection model in human macrophages in general.

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

Actually, I have had more than one mentor helping me so far, which I am very grateful for. However, this and previous work was achieved with great support of my doctoral supervisor Stefan Linder, who has been always constructive, honest and kind, supporting my work and ideas. Joining his lab was a very good idea!

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?

Science-related classes in school were always my favorites. I was always curious about how things work and what causes problems within organisms and machines. Yet, there are so many questions waiting to be answered and, luckily, every time we answer one, we raise two or more questions. There will always be plenty of work to do!

What's next for you?

I have chosen to leave academia after my postdoc and start working in a more industry-based environment, particularly in clinical immunomonitoring in a biopharmaceutical company. I truly enjoy working in an academic environment and I am grateful for getting so many insights into academic research. However, becoming an independent researcher or group leader is tough. There is also the pressure of short-term contracts. In the end, I made this decision for both personal and professional reasons.

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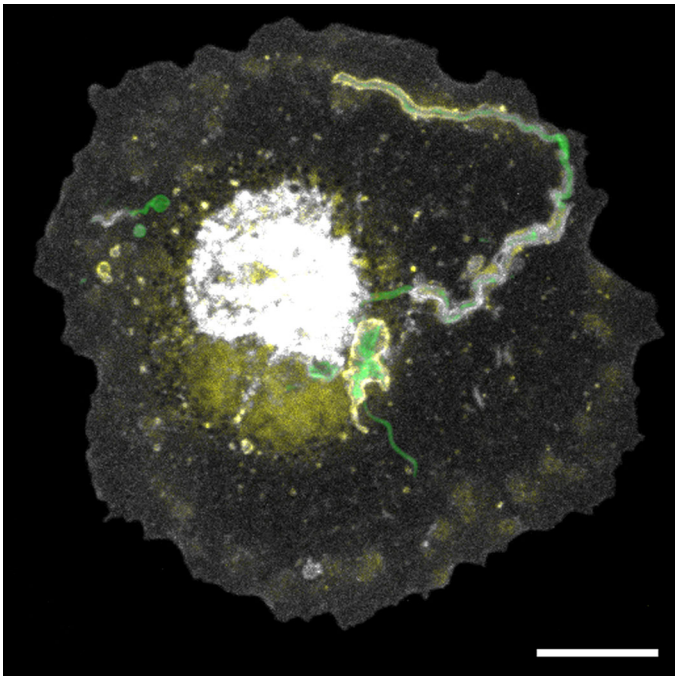

Huge appetite of macrophages. Primary human macrophage expressing the phosphatidylserine marker RFP–LactC2 (gray) and phagosomal marker GFP–Rab22a (yellow), which internalizes borreliae (green). Note the pronounced length of the spirochetes (up to 40 µm). Scale bar: 10 µm.

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

After work, I like to be outside, especially climbing and bouldering. Hamburg and its surrounding region are pretty flat, therefore, I sometimes have to go inside again and use a climbing wall. I also enjoy creating different beers during experimental brewing sessions, an activity that probably originates from also being a combined biotechnologist and researcher. During the fermentation process and another COVID-19 lockdown, there is always time for a song on the guitar.

Reference

Klose, M., Scheungrab, M., Luckner, M., Wanner, G. and Linder, S. (2021). FIB-SEM-based analysis of *Borrelia* intracellular processing by human macrophages. *J. Cell Sci.* **134**, jcs252320. doi:10.1242/jcs.252320