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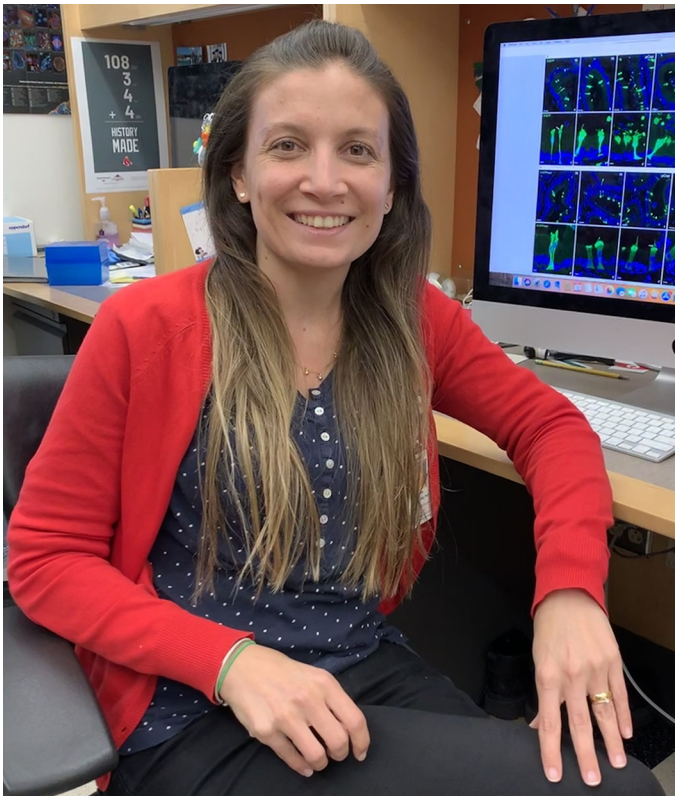
First person – Maria Agustina Battistone

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. Maria Agustina Battistone is first author on 'Novel role of proton-secreting epithelial cells in sperm maturation and mucosal immunity', published in JCS. Maria Agustina is an instructor in medicine at Harvard Medical School and Massachusetts General Hospital in the lab of Dr Sylvie Breton at Massachusetts General Hospital, Boston, MA, where she is interested in epithelial function and immune modulation in the male reproductive tract, in order to uncover relevant mechanisms in the pathogenesis of male infertility.



Maria Agustina Battistone

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

The immune system is designed to recognize and destroy foreign cells that would otherwise cause infection but at the same time it is capable of regulating mechanisms to prevent self-damage to healthy cells. Epithelial cells provide a barrier to the environment and can activate the immune system under certain conditions. Within the epididymis, an organ of the male reproductive tract, epithelial cells need to protect auto-antigenic sperm cells which appear during puberty after the immune system has 'learned' to detect 'self' versus 'strange/external' cells and to provide protection against pathogens. The crucial function of the epididymal epithelium is to establish an optimal environment for the maturation and storage of spermatozoa. This also includes transfer of proteins from epithelial cells to sperm cells, a process that has not been studied in detail. The current manuscript shows that specialized epithelial cells, narrow and clear cells involved in acid secretion to maintain 'quiescent' sperm, can also switch their function to become regulators of the immune system while establishing close interactions with spermatozoa through apical protrusions. The breakdown of the equilibrium between the epididymal mucosa and sperm could be potentially involved in a significant number of male infertility cases.

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

The main challenge of our project was to isolate by double cell sorting enough live EGFP-positive clear cells from each epididymal region from our transgenic mice, in which clear cells express EGFP. We spent quite some time setting up the conditions and the number of epididymides we needed for that.

Another big challenge for this project was to demonstrate that clear cells present several types of apical protrusions and communicate with the sperm. We used high-resolution confocal microscopy, in combination with 3D reconstruction, and the AMNIS technology to clearly demonstrate that these cells have the plasticity to produce the 'funny' apical structures.

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

In this project, I believe that we had two eureka moments. The first was when Dr Sylvie Breton, my mentor, and I were looking in the confocal microscope and we saw these amazing apical long protrusions on clear cells for the first time. We were fascinated to discover different stunning shapes, and that some could touch sperm cells.

The other moment occurred when we discovered the presence of unexpected immune transcripts in clear cells. This changed the direction of our study; we then aimed to demonstrate that these cells play a crucial role as immune sensors and mediators.

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

Since our findings have critical implications in a number of different areas including reproductive biology, protein-secreting epithelial physiology, cell biology and immunology, we strongly felt that sharing our results with Journal of Cell Science, a high-quality journal, would reach a broad audience of cell biologists.

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

I am very thankful to Dr Sylvie Breton, my mentor who supported me all the way through this project and importantly, in my scientific career. She has been hugely supportive in discussing results, sharing her knowledge and encouraging me to develop new techniques in building this project. In addition, I have been fortunate to have had

Maria Agustina Battistone's contact details: Massachusetts General Hospital, 185 Cambridge St., Room 8150, Boston, MA, USA.
E-mail: mbattistone@mgh.harvard.edu

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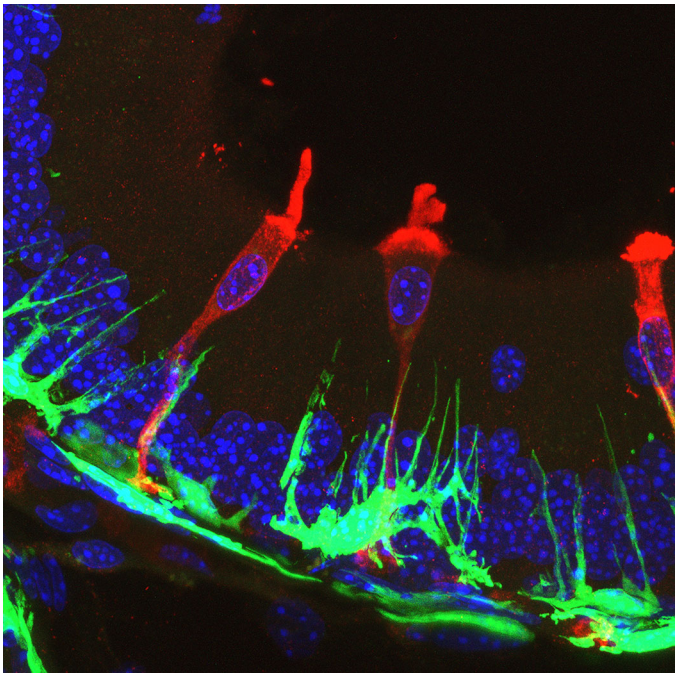

Close interaction between epididymal epithelial narrow cells and mononuclear phagocytes in the initial segments of the epididymis.

the help of Dr Dennis Brown in shaping this project with his valuable suggestions.

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?

Since childhood I have always been fascinated by how 'life' works. I remember looking at leaves and bugs in my toy microscope or performing 'experiments' with water and salt in my garden. My curiosity about how cells perform their functions, how they are communicating with other cells and what happens in disease is what motivated me to be what I really want to be, a scientist.

Who are your role models in science? Why?

I admire scientists who are passionate about their work, think critically and share their knowledge. In particular, I admire my current supervisors; Dr Sylvie Breton and Dr Dennis Brown. I hope to acquire some of their tremendous scientific skills that they are generous to offer to me. I learn something new from every person I talk to, whether I'm in the lab or on the street. I also want to recognize the role of all my previous Argentinian professors and mentors who have contributed to my career as a scientist.

What's next for you?

My future career plan is to become an independent scientist to uncover relevant mechanisms in the pathogenesis of male infertility. I am applying for independent funding and I am looking forward to establishing my own research group.

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

I love spending time with my family and friends, especially if we are drinking mate, a traditional Argentinian drink.

Reference

Battistone, M. A., Spallanzani, R. G., Mendelsohn, A. C., Capen, D., Nair, A. V., Brown, D. and Breton, S. (2020). Novel role of proton-secreting epithelial cells in sperm maturation and mucosal immunity. *J. Cell Sci.* **133**, 233239. doi:10.1242/jcs.233239