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FIRST PERSON

First person – Arturo Matamoros

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. Arturo Matamoros is first author on 'Capacitation-associated alkalization in human sperm is differentially controlled at the subcellular level', published in JCS. Arturo is a PhD student in the lab of Claudia L. Treviño at the Biotechnology Institute, UNAM, Mexico, investigating human spermatozoa in order to decipher the molecular mechanisms to control the processes that make the sperm capable of swimming and fusing with the oocyte.

Arturo Matamoros

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

Sperm cells are not able to generate *de novo* proteins. To respond to the stimulus from the environment and achieve their goal, they depend on already synthetized proteins. In this regard, intracellular pH regulation is essential to control the function of the many proteins involved in the main sperm functions. We described that sperm cells contain spatially differential pH levels in the head and the tail, which are regulated by the action of proteins with differential subcellular localization in the cell, such as bicarbonate transporters, acting mainly in the head, and the Hv1 proton channel, localized in the tail. Interestingly, when these proteins were inhibited, especially Hv1, the cells were not able to develop a special type of motility named hyperactivation, which is necessary for fertilization. This suggests that this spatially heterogeneity of the pH is pivotal for the regulation of sperm motility and probably other functions related with sperm success.

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

One of the main issues when working with sperm cells is the fact that you cannot employ the conventional techniques of molecular biology to manipulate the expression of proteins of interest. So, for years, the way to solve this has been to employ fluorescent markers to follow different aspects of their physiology and pharmacological tools to elucidate whether a given protein is participating in such a process. Nevertheless, traditional fluorescence evaluation techniques have some trade-offs, including a lack of spatial resolution (spectrofluorometry and flow cytometry) or a reduced number of cells analyzed (video microscopy). To overcome this, we employed image-based flow cytometry, a methodology that combines the subcellular resolution and the population analysis. With this approach, we were able to analyze how the pH behaves thanks to the fluorescent marker and in which part of the cell these changes were occurring thanks to the high resolution pictures of each single cell in the flow stream.

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

When we started to employ a pharmacological approach to investigate the proteins involved in pH regulation and found that, indeed, the antagonist employed produced pH changes in a subcellular differential manner. But most surprising was when we noticed that these effects were consistent with the protein localization. I like to draw in my mind how these signals are working inside the cells.

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

I came across this journal for the first time during my bachelor degree. I started to read the Cell Science at a Glance publications. Particularly, I remember one article about apoptosis, especially regarding the diversity and biology of death receptors (I loved that topic at the beginning just because it included the term 'death'). Over time, I started to read many of the cell biology papers, including some on sperm biology in JCS. When it was the time to choose where to publish, I strongly considered JCS since it is a well-recognized journal and because the publisher is a not-for-profit organization.

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

Since I met my supervisor, Claudia Treviño, I think we (or at least I think so, we'd have to ask her) immediately 'clicked'; since the beginning, she trusted in me and encouraged me to be independent and critical. She is very a passionate scientist but also is a person

Arturo Matamoros's contact details: Biotechnology Institute, UNAM, Mexico.
E-mail: artmav@gmail.com

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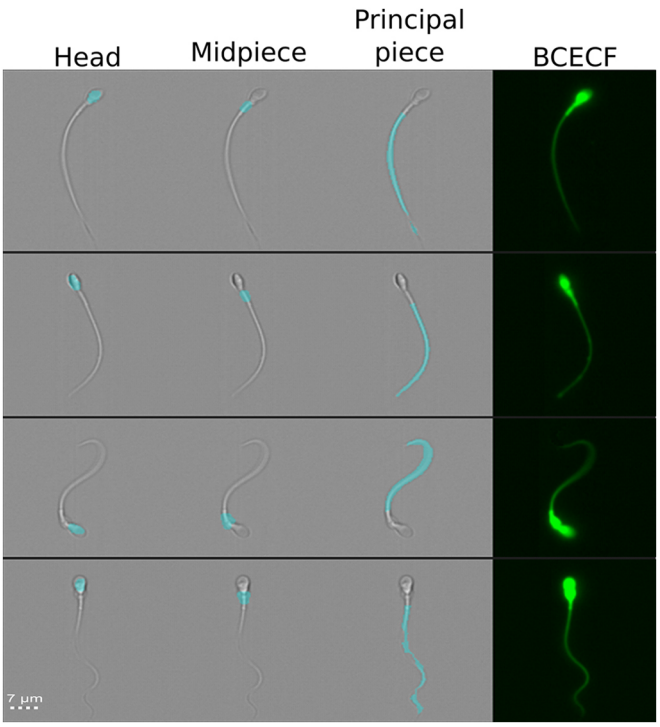

Photographs of human sperm cells obtained by image-based flow cytometry. The blue mark in the three first columns of brightfield images represents the segmentation result to analyze sperm subcellular regions. The last column shows cells stained with pH-sensitive probe BCECF.

who you can count on for everything. Her guidance and support have been essential to my scientific training.

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?

From when I was a child, my parents always encouraged me to be curious and wonder about how the world works. This curiosity was the seed to pursue a biology major. With luck, I obtained a scholarship to realize internships in some labs including Claudia Treviño's lab. After these periods, I decided to continue with my master's degree and today with my PhD, and here I am.

What's next for you?

Finishing my PhD! Being idealistic, I would like still to work in science, do a postdoc, have a position one day and so on. Nowadays the future life of a PhD student from a developing country is more and more complex and unpredictable. However, I like to be an optimistic person.

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

What I really want is to change the world. I do not know how, but if I can help just one person with my knowledge or guidance, maybe I'd be happy for having changed a part of it.

Reference

Matamoros-Volante, A. and Treviño, C. L. (2020). Capacitation-associated alkalization in human sperm is differentially controlled at the subcellular level. *J. Cell. Sci.* **133**, jcs238816. doi:10.1242/jcs.238816