


PEOPLE & IDEAS

María Mittelbrunn: Science feeds my curiosity every day

Lucie Van Emmenis 

María Mittelbrunn leads the Immunometabolism and Inflammation Laboratory at the Severo Ochoa Molecular Biology Center. Her lab takes a multidisciplinary approach to explore immunometabolism as a therapeutic target in the treatment of chronic inflammation and aging. We recently spoke to María about the joy of discussing results with your team and how this can influence future projects, and optimism about the future of research.

Please tell us a little about yourself and how you first became interested in science.

I was born in Madrid, Spain, but all of my family are from a little town on the north coast of Spain named Luarca, my favorite place in the world. One summer, when I was around 7 yr old, I met the Nobel Prize winner Severo Ochoa, who was a friend of my family. I like to believe that my interest in science began that day. 37 yr later, I now run a lab in the Severo Ochoa Molecular Biology Center.

Tell us about your career trajectory, and what led you to becoming a group leader.

I try to balance between science and family, but sometimes you need to choose, and in that case I have no doubt that I will put my family first. An example of this is that just after defending my PhD, when I was a new mom, I decided not to apply for a postdoc outside of my research institute and instead applied internally. This decision put my career at risk, and I spent a few years on the edge of leaving my career in science. I failed to obtain fellowships and grants, and all doors seemed closed to me for a while. But I am not used to giving up! I applied for an ERC [European Research Council] Starting Grant in 2016 and although I was initially unsuccessful, I was selected for the reserve list, and finally I got it! This was a real inflection point in my career, as the ERC grant

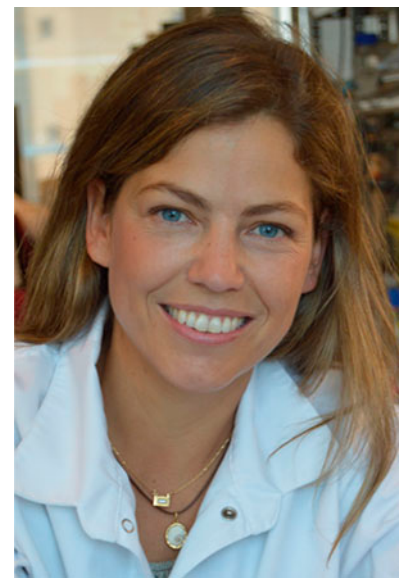
gave me the opportunity to choose which institution I wanted to work in and the ability to recruit amazing team members to develop the science I had always dreamt of.

How did you first become interested in immunometabolism and inflammation, and their roles in aging?

When I was an undergraduate student, I was fascinated by immunology lectures, especially those delivered by Prof. Sanchez-Madrid. Learning about how the immune system distinguished between self or not self, between healthy cells or tumoral infected cells, was fascinating. The immune system is the most powerful tool we have to ensure a healthy life, but it can also make serious mistakes. We believe that understanding how the immune system function deteriorates with age, and the consequences of this, will give us an opportunity to intervene and to propose therapeutic tools to control or delay many age-related diseases.

What are you currently working on, and what projects are you most excited about?

Our current mission is to understand the molecular mechanism by which an aged immune system, specifically T cells, contributes to inflammaging, senescence, and age-related diseases, and we are working on many different hypotheses. It could be caused because old T cells may



María Mittelbrunn.

acquire an autoaggressive phenotype, or because they lose their protective function controlling the microbiome, or the recognition and depletion of senescence cells. Most likely, it is a combination of all of these. Understanding the molecular mechanisms by which old T cells contribute to aging will give us an opportunity to intervene and to develop strategies with the final purpose of improving immune system function, and preventing inflammaging and age-associated diseases.

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Please tell us about some work in your field that you are currently interested in.

Research in the oncoimmunology field has enabled the development of new therapeutic tools against cancer. Thanks to these studies, in the last decade immunotherapy has revolutionized cancer treatment. I believe that in the next decade, neuroimmunology research will deliver new therapeutic opportunities for neurodegeneration. I am excited about the crosstalk between the immune system, microbiome, and neurodegeneration.

What are some of the qualities that you learned during your graduate studies or postdoc that you maintain and foster in your own lab?

As a PhD student and postdoc I was encouraged to contribute to the lab in the form of writing grants and papers, designing projects, and supervising master's students. I think it is great to start doing these tasks as soon as possible to gain confidence, and to partially assume your own risk and responsibility. I love hearing ideas from postdocs and graduate students—their ideas are much better than mine!

This year at JEM we are focusing on women in STEM. We have heard about mentorship, the need for parity between men and women, and ways in which labs can promote healthy working environments. Is there a specific aspect of scientific culture that you feel requires change or an area that you feel passionately about?

I think there are two weaknesses in women's access to STEM-related careers. First, when choosing careers, compared to boys, there are fewer girls who choose math, engineering, or technology careers. We may never reach absolute parity, but that doesn't worry me as long as there isn't a single girl who stops studying and being what she wants.

The second moment of risk is with motherhood. Maternity cannot penalize our development as a scientist. Nowadays, there are more and more projects calls that have extended their deadlines, which makes them more accessible if you are a mother. And there are more and more countries that give paternal leave of the same duration as maternity leave. This is so important.

Do you feel optimistic about the future for women in science?

Absolutely. My generation has already had it much easier thanks to previous generations of scientists who have opened the way for us. There is a lot of discussion today about how to promote the empowerment of women, and I like to say to my daughters and students that "Knowledge is what gives you power."

What do you most enjoy about your role as a group leader?

I like discussing results and trying to interpret the findings. I love when results drive you into fields that you never thought to explore and you have never been interested in. I have infinite curiosity, and science feeds my curiosity every day. This is what I like most about being a scientist.

While not in the lab, how do you like to spend your time, or alternatively, how would you like to spend your time?

I love skiing, walking on the beach, enjoying a good dinner with friends, and spending time with my family and my daughters.