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FIRST PERSON

First person – Erika Testa

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. Erika Testa is the first author on '*H2afx* and *Mdc1* promote maintenance of genomic integrity in male germ cells', published in Journal of Cell Science. Erika is a PhD student in the lab of Dr Marco Barchi at the University of Rome Tor Vergata, Rome, Italy, investigating meiosis, DNA repair, genome stability of meiotic cells and male fertility.

How would you explain the main findings of your paper to non-scientific family and friends?

All the cells in our body contain DNA, which is the repository of genetic information required to sustain life. Every day, DNA integrity and stability is continuously under attack by many different internal and external chemical and physical agents. Any resulting damage, if not repaired, may lead to mutation and possibly disease. During cell division and growth, a process that occurs in most tissues of our body, checkpoints monitor DNA integrity, arresting new cell growth and promoting DNA repair, before generating new cells. This maintenance of genome stability is also a key process in meiotic cells. Meiosis is a process that occurs in a reduced number of cells in our body within the gonads, generating germ cells (or gametes): oocytes (eggs) in the ovary and sperm in the testis. Germ cells are responsible for the transmission of genetic information to the next generation. As such, production of gametes with an intact full set of DNA is crucial for the prevention of birth defects. DNA damage generated in meiotic cells must be repaired properly and in a timely manner before gametes are formed, in order to prevent premature cell death or transmission of mutation. Remarkably, germ cells self-inflict DNA damage as part of a programmed developmental process that leads to the exchange of genetic material (crossing-over) between the chromosomes from each parent. Each child from the same parents is different because of this genetic exchange during development of the embryo.

H2afx and *Mdc1* are genes with well-characterized roles in DNA repair and checkpoint activation in dividing cells. In our study, we demonstrate that they also play an important function in preservation of genome stability during meiosis. We show that in the same way a parent holds a child's hand until they have safely crossed the street, these genes hold progression of meiotic cells during meiosis until DNA has been properly repaired. Moreover, we show evidence that, as previously found in dividing cells, *H2afx* promotes repair of DNA and, along with *Mdc1*, formation of cross-overs.

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

One challenge of this project was to identify the fine regulatory mechanisms of *H2afx* and *Mdc1* using genetically modified mice. It took years to generate mice and analyse their phenotype in detail. Long hours at the microscope and thoughtful discussions with my PhD supervisor, Dr Barchi, and other PhD students allowed me to overcome the difficulties encountered each time. Another challenge was to demonstrate the involvement of P53 in the activation of the *H2afx*- and *Mdc1*-mediated checkpoint. Reviewers asked whether the 'activated P53' signal we were observing was actually specific. I was able to verify this by treating mouse embryonic fibroblasts (MEFs) from wild-type and $p53^{-/-}$ mice with bleomycin to induce a DNA damage. By performing western blot analysis on nuclear extracts using our antibody, I observed activation of P53 only in wild-type cells treated with bleomycin. This simple experiment was challenging for me because I had never worked with primary cell culture, but it demonstrated the specificity of our antibody.

Erika Testa

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

Yes! When I saw my clear western blot result of the 'activated P53' on MEFs.

Have you had any significant mentors, and how have they helped you?

My PhD tutor and mentor is Dr Marco Barchi, a researcher and teacher of human anatomy at the University of Rome Tor Vergata.

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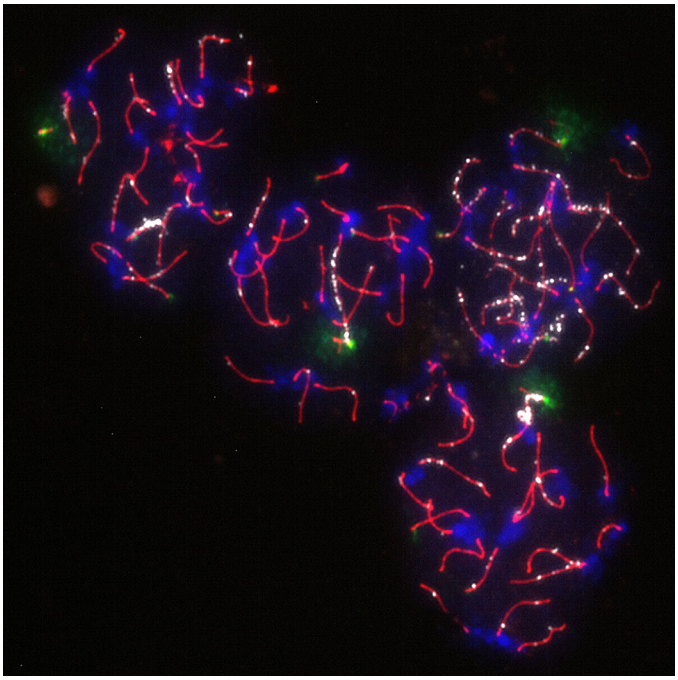

Chromosomes (red) within meiotic cells. Breakpoints on chromosomes are represented by white spots, and the green signal represents a small region of the Y-chromosome.

He gave me the opportunity to learn how a researcher should set up their scientific project. On the other hand, he is also a colleague because he taught me many experimental techniques, constantly gives me good advice and also supports me in the more difficult moments of the project.

> **"Even if an experiment is negative, the most important thing is not the result itself, but to understand why the experiment was not successful"**

What's the most important piece of advice you would give first-year PhD students?

For future researchers, the first year of a PhD is very interesting because everything is exciting. My advice is to maintain the same enthusiasm in the following years and beyond. Even if an experiment is negative, the most important thing is not the result itself, but to understand why the experiment was not successful. This involves finding possible explanations in literature or discussing the experiment with more experienced people. Ultimately, I recommend taking as much time as is necessary to read all the relevant scientific literature, to truly understand the meaning of the project, and understand how to interpret the results.

What changes do you think could improve the professional lives of early-career scientists?

To improve the professional lives of early-career scientists, it is important to promote start-up grants and other types of economic support. Often, academic and/or political institutions in Italy offer few opportunities to find employment in laboratories undertaking basic research. Therefore, the type of experiments and quality of an early-career researcher's professional life (such as attending international seminars and congresses) often depend on how much funding is available to the leader of their group. I also believe it is important to gain experience working abroad to improve your prospects for future positions.

What's next for you?

At the moment I'm in the final year of my PhD and am starting to write up my thesis. At the same time, I'm looking around to find a post-doctoral position, hoping for a project involving my specialties, meiosis and male fertility. I would like to undertake a master's degree in assisted reproduction, and in the future possibly carry out work experience in an assisted reproduction laboratory or facility.

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

When I'm not in the lab, I spend my free time watching sci-fi movies at home. I enjoy going out with my friends to the countryside and to the beach, especially on sunny days, or visiting new towns to discover their history and architectural beauty.

Reference

Testa, E., Nardozi, D., Antinozzi, C., Faieta, M., Di Cecca, S., Caggiano, C., Fukuda, T., Bonanno, E., Zhenkun, L., Maldonado, A. et al. (2018). H2AFX and MDC1 promote maintenance of genomic integrity in male germ cells. *J. Cell Sci.* **131**, jcs214411.