

FIRST PERSON

First person – Alessandro Soloperto

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. Alessandro Soloperto is the first author on 'Mechano-sensitization of mammalian neuronal networks through expression of the bacterial large-conductance mechanosensitive ion channel', published in Journal of Cell Science. Alessandro is a PhD student in the lab of Francesco Difato at Istituto Italiano di Tecnologia, Genoa, Italy, investigating the potential of targeted modulation of the neuronal Ca^{2+} activity via remote mechanical stimulation.

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

Sometimes, when we speak about some of our personal experiences, which bring us to a deep knowledge or consciousness, we use the sentence: "I had the opportunity to touch it with my hands". The phenomenon underlying the perception of touch is mechanical sensing or, in other words, the ability to encode and process mechanical cues.

In our work, we modified one of the mechanical sensing elements of bacteria, a simple living organism, and then we expressed it in the brain cells of rodents, a mammalian organism. In doing so, we were able to successfully modify the 'touch' sensation of the brain cells without compromising their survival and physiological activity. In future, we would like to exploit such modification of the 'touch' sensation to further study the role of mechanical cues in cell physiology, eventually providing a new tool to investigate some brain disorders by the use of gentle pressure waves such as acoustic waves. The motto of our research may be: make your brain a healthy conductor by playing the right music.

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

At the beginning it was a particular struggle to define the proper amount of DNA to use for mechano-sensitizing the primary neuronal cells without altering their physiology. We spent a few months running only titration assays to determine the correct amount of DNA to use. Once we did it, it was particularly satisfying and, at the same time, surprising to see how the neurons were responding to the mechanical stimulation without showing any significant alterations.

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

Yes, I have. I have been lucky to pursue a PhD under the supervision of Dr Francesco Difato, who has been a friend and an enthusiastic scientist. Together with Francesco, Dr Andrea Contestabile and Dr Anna Boccaccio taught me the essential role of critical thinking, and how to perform research with rigor.

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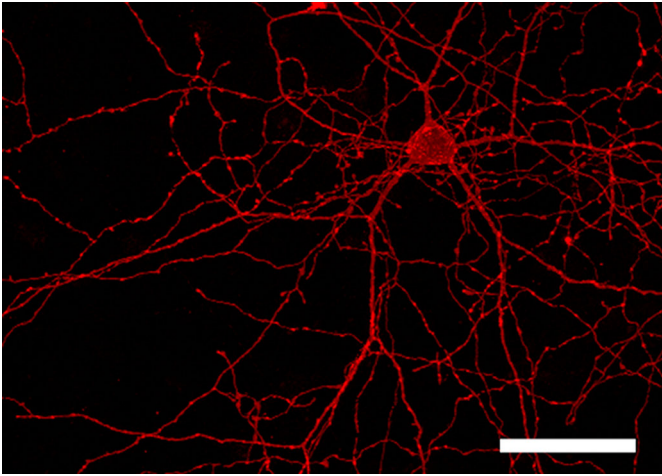
"It is really important to keep your private life unaltered, finding a proper work–life balance."

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

It is really important to keep your private life unaltered, finding a proper work–life balance. First-year PhD students usually tend to stay in the lab longer than others, and most of the time this is not really a productive approach because at the end of the day you get tired and can't focus as well. Leaving the lab at a reasonable time, and maybe meeting some friends for a drink after work, would help to refresh your brain and your ideas, and keep you more efficient and productive the day after. Words from a neurobiologist!

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

I deeply believe that a plot twist is needed in biomedical research. Nowadays the number of people pursuing a PhD is growing fast, and sooner or later there will not be enough job opportunities in academia. In this context, a strong and reliable link between academia and industry is missing in many countries. Indeed, most of the time, early career scientists, such as myself, face the lack of



Maximum projection of a confocal z-stack of a primary cortical neuron expressing G22S eMscL fused to tdTomato fluorescent protein (scale bar: 50 μ m).

entry-level positions in the R&D industry, and become ‘too experienced’ or simply ‘too old’ after a post-doc. We all would

benefit from an easier transition from academia to industry and, vice versa, with, at least, a more adequate economic reward.

What’s next for you?

In the future, I would like to work in the field of stem cell and 3D cell cultures, organoid technology and similar, in order to study the mechanobiology of tissue development, and to investigate the synergistic interplay between cellular mechano-sensitivity and scaffold mechanical features for regenerative medicine applications.

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

I have been always in love with biology. The first time I got close to biology, I was 11 and my brother gave me as a birthday gift a short review book on state-of-the-art cell and molecular biology, together with a microscope kit for collecting biological samples in the countryside.

Reference

Soloperto, A., Boccaccio, A., Contestabile, A., Moroni, M., Hallinan, G. I., Palazzolo, G., Chad, J., Deinhardt, K., Carugo, D. and Difato, F. (2018). Mechano-sensitization of mammalian neuronal networks through expression of the bacterial large-conductance mechanosensitive ion channel. *J. Cell Sci.* **131**, jcs210393.