

FIRST PERSON

First person – Alessandra Gallo

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. Alessandra Gallo is first author on 'Role of the Sec22b–E-Syt complex in neurite growth and ramification', published in JCS. Alessandra currently works as a medical affairs manager for the biotech company Alzohis, Paris, France, in the lab of Romain Verpillot, investigating the molecular mechanisms of neurodevelopment and neurodegeneration.

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

As an integral part of the cell, the plasma membrane (PM) expands its surface in concert with the cell's growth. Neuronal PM expansion is a massive phenomenon as these cells grow long neurites, which can extend meters away from the cell body. Membrane expansion during neuronal development mainly occurs through the fusion of secretory vesicles with the PM. However, non-vesicular mechanisms can also participate. By using a combination of biochemical (immunoprecipitation) and imaging techniques (proximity ligation assay, live-imaging confocal and STED microscopy), we found that the non-fusogenic Sec22b–Stx1 SNARE complex interacts with proteins belonging to the family of the endoplasmic reticulum (ER)-resident extended-synaptotagmins (E-Syts). E-Syts reside at ER–PM contact sites, where they function as lipid transfer proteins between the ER and PM. We showed that overexpression of E-Syts increased the growth of filopodia in developing neurons. Interestingly, such E-Syt-mediated morphogenetic effect appears to be dependent on Sec22b and Stx1, as impairing the correct function of these two proteins abolished the enhanced growth promoted by E-Syt overexpression. These findings support the idea that the Sec22b–Stx1–E-Syt complex may contribute to membrane expansion through a non-vesicular mechanism of lipid transfer mediated by E-Syts at ER–PM contact sites.

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

After having identified the biochemical association between Sec22b, Stx1 and E-Syts, one of our main challenges was to visualize this complex at ER–PM contact sites. To achieve this, we combined different imaging approaches, from the proximity ligation assay, for a first *in situ* detection of associated endogenous proteins, to the more challenging 3D STED microscopy, to visualize colocalizing Sec22b–E-Syt particles at super-resolution in growth cones of developing neurons. Furthermore, 3D STED allowed us to measure the distance between associated particles and the plasma membrane, and we found this was compatible with the typical distance of ER–PM contact sites. As E-Syt proteins are not highly expressed in neurons, the main difficulty in these experiments was to find the correct protocols and settings to visualize their association with Sec22b in structures as small as ER–PM contacts.

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Alessandra Gallo

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

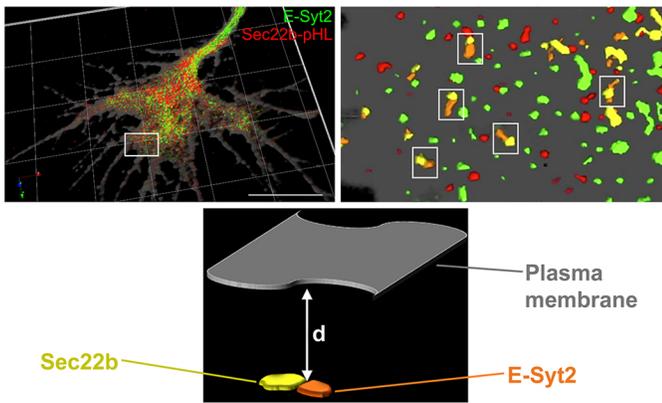
My 'eureka' moment was the first biochemical experiment showing the interaction between the Sec22b complex and E-Syts. I was at the beginning of my first year of PhD and I did not expect to get such an important result so soon. Being a novice in GFP-Trap, I first thought I had made a mistake. Therefore, I repeated this experiment many, many times before definitely believing what I was observing. This initial enthusiasm made me fall in love with my project and continued to drive me for the rest of my PhD.

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

Journal of Cell Science publishes very high-quality articles covering a wide range of topics in cell biology. The focus of my project, on membrane traffic and cell development, made JCS a very fitting choice for publication of my manuscript.

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

During my PhD, I was supervised by Prof. Thierry Galli and Prof. Christian Vannier. In different but complementary ways, they both have been instrumental in my development and maturation as a



3D STED reconstruction of E-Syt2–Sec22b colocalization in the growth cone of a developing neuron. Sec22b statistically associated with E-Syt2 is in yellow; E-Syt2 statistically associated with Sec22b is in orange. The median distance between associated particles and the plasma membrane is 33.6 nm, which is compatible with the size of an ER–PM contact site.

researcher. I would like to give a special thank you to Christian, who has been my supervisor, my mentor and my ‘second father’. I will never stop thanking him for having shared with me his knowledge, his enthusiasm and his passion for biochemistry... and for astronomy. One of my favorite memories is the long and passionate discussions on astronomy related to neurobiology, which we used to call ‘recreations of neuroastronomy’.

Who are your role models in science? Why?

All the people I met during my scientific career have become, in a way, my role models, from the Master’s students to the big scientific figures in the field of membrane trafficking. I think everyone has taught me important lessons, some of them more difficult than others, which all contributed to shape my experience, allowing me to grow as a scientist and as a person.

What’s next for you?

I love experiment design and bench work but what I like the most is writing about science and science communication. After graduating from my PhD, I was lucky to find a job that completely satisfies my passions in a young and dynamic biotech company working on Alzheimer’s disease. Even after leaving academia, I am still pursuing a scientific career, working in a field that better fits my skills and in which I think I can give my best.

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

My Italian nature drives me toward the art of cooking. I am not as good as my mother yet, but my tiramisù is already great, and I am improving more and more on the rest. Now that I have left academia, the kitchen is my new bench work!

Reference

Gallo, A., Danglot, L., Giordano, F., Hewlett, B., Binz, T., Vannier, C. and Galli, T. (2020). Role of the Sec22b–E-Syt complex in neurite growth and ramification. *J. Cell Sci.* **133**, jcs247148. doi:10.1242/jcs.247148