05/03/2018 [redacted]

Curriculum Vitae

Contact details

Name: Francesco Trovato

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Place and date of Birth: [redacted]

Education

7/2011	Bachelor Degree	Molecular Biology	University of Pisa
10/2013	Master Degree	Biotechnology	University of Pisa

Academic Appointments

12/2013 – 03/2018	PhD scolarship	Molecular biophysics	Scuola Normale Superiore
04/2018 – 04/2019	Fellowship (assegno di ricerca)		Scuola Normale Superiore

Experience

06/2017 – 12/2017	Internship	Human stem cells and Organoids culturing	Yale University, Child Study Center

PhD Thesis

Development of a fluorescent reporter tool for *in vivo* mosaic mutant analysis. Supervisor: Dr. Gian Michele Ratto

Publications

- Paper: "Brain-wide Mapping of Endogenous Serotonergic Transmission via Chemogenetic fMRI." Giorgi A, Migliarini S, Galbusera A, Maddaloni G, Mereu M, Margiani G, Gritti M, Landi S, Trovato F, Bertozzi SM, Armirotti A, Ratto GM, De Luca MA, Tonini R, Gozzi A, Pasqualetti M. Cell Rep. 2017 Oct 24;21(4):910-918. doi: 10.1016/j.celrep.2017.09.087.

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- Paper: "Simultaneous two-photon imaging of intracellular chloride concentration and pH in mouse pyramidal neurons in vivo."
Sulis Sato S, Artoni P, Landi S, Cozzolino O, Parra R, Pracucci E, Trovato F, Szczurkowska J, Luin S, Arosio D, Beltram F, Cancedda L, Kaila K, Ratto GM.
Proc Natl Acad Sci U S A. 2017 Oct 10;114(41):E8770-E8779. doi: 10.1073/pnas.1702861114. Epub 2017 Sep 26.

-Review: "Understanding spreading depression from headache to sudden unexpected death."
Cozzolino, O., Marchese, M., Trovato, F., Pracucci, E., Ratto, G.M., Buzzi, G., Sicca, F., Santorelli, F.M., Frontiers Neurology 2018.

Poster and meetings

- Poster: "Developmental EGABA shift in neocortical neurons demonstrated by two-photon microscopy in vivo". Authors: Artoni, P., Sulis Sato, S., Landi, S., Luin, S., Parra, R., Pracucci, E., Szczurkowska, J., Trovato, F., Arosio, D., Beltram, F., Cancedda, L., Kaila, K., Ratto, G.M. Conference: 10th FENS Forum of Neuroscience 2016, July 2-6, 2016 Copenhagen (Denmark).

- Poster:"In vivo measurement of intracellular Chloride and pH during neuronal development by means of 2-photon spectroscopy". Authors: Sulis Sato, S., Artoni, P., Idilli, A., Landi, S., Luin, S., Parra, R., Szczurkowska, J., Trovato, F., Arosio, D., Beltram, F., Cancedda, L., Ratto, G. M. Conference: Neuroscience 2014, November 15-19, 2014, Washington, DC (USA).

- Poster: "Beatrix: a fluorescent sensor for the activity of CRE recombinase in vivo". Authors: Parra, R., Trovato, F., Sulis Sato, S., Landi, S., Cancedda, L., Lodovichi, L., Sala, C., Verpelli, C., Ratto, G.M. Conference: CNR Neuroscience retreat, September 18-20, 2013, Cagliari (Italy).

-Meeting: PCDH19 Pediatric Epilepsy Professional and Family Symposium, UCSF San Francisco june 2016

Computer skills

Data analysis software: Origin 9.0 and previous versions;
Image analysis: ImageJ and Fiji libraries
Basics of Matlab programming (Custom data analysis and data acquisition programs)
Serial Cloner
Microsoft Office

Lab skills

Molecular design and production, molecular biology and DNA cloning.
Mice handling and surgery, head mouse implantation and craniotomy, In Utero Electroporation surgery, In vivo electrophysiology, In vivo 2photon quantitative imaging, Optics, Analog and digital electronics. Primary neurons and astrocytes culturing and transfection, Stem cell culturing, Tridimensional cell culturing, Organoids culturing and development.

Narrative Report

My doctoral research activity is focused on the development of a new Cre fluorescent reporter system capable to enhance Cre recombinase activity providing increased sensitivity and reliability in monitoring Cre activity. This reporter system is specifically designed to develop a new technique for *in vivo* mosaic

mutant analysis in mice by means of two-photon microscopy, allowing the study of cell-autonomous effects caused by the lack of a single gene in scattered mutant cells in a wildtype environment. Originally, we developed this tool for the generation of a novel model of mosaicism for the expression of the PTEN gene (implied in cancer development and progression), but we are realizing that this technique is likely to have a large spectra of applications in neuroscience and experimental oncology

Furthermore, to ensure a finely-tuned temporal control of the enzyme, I developed a new tamoxifen--inducible version of Cre, specifically designed to be used in tandem with our sensor. This approach represents a new inducible Cre-Reporter system endowed by a very low background activity and a high Cre activation rate following tamoxifen administration.

Part of my research was also focused on in vivo imaging of the Chloride (Cl) concentration in the living mouse brain. There is a great interest from the scientific community on measurements of Cl (and pH) in neurons during development, since changes in Cl regulation are at the basis of the polarity switch of GABAergic currents. Furthermore, several diseases such as autism involve alterations in the homeostasis of Cl in neurons. In this project I am contributing to the development of a novel imaging technique for in vivo imaging of Chloride.

Finally, during my training I have been participating to ongoing studies employing combined electrophysiology and *in vivo* two-photon imaging of Calcium activity in the mouse cortex.

Thus, I acquired skills crucial for *in vivo* experiments such as imaging, spectroscopy, programming, electronics and data analysis. I learned how to perform the design of molecular architectures, cloning procedures, as well as surgeries, and principles of computer programming and data analysis.

From June to December 2017 I spent a period at the Yale University in the lab of Dr. Gianfilippo Coppola, during which I acquired new skills on human and murine stem cells, tridimensional cell cultures, and organoids development and culturing. During this period I exploited my experience in two photon imaging to study functionally and structurally the activity of growing organoids.