

CURRICULUM VITAE of MAURA FRANCOLINI

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CURRENT POSITION:

November 2017 – present: Associate professor of Applied Biology at the Department of Medical Biotechnology and Translational Medicine, Università degli Studi di Milano, (Milan, Italy) and Associate Researcher at the Neuroscience Institute (IN) of the National Research Council (CNR) in Milan

PROFESSIONAL ACTIVITY:

February 2000 – October 2017: Research Technician (D5) – Referent scientist of the Optical and Electron Microscopy Unit at the Department of Medical Biotechnology and Translational Medicine, Università degli Studi di Milano, (Milan, Italy) and Associate Researcher at the Neuroscience Institute (IN) of the National Research Council (CNR) in Milan

2016-2017: Adjunct professor in *Applied Pharmacology to Biotechnology* for the *Master Science Course in Medical Biotechnology and Molecular Medicine* – Università degli Studi di Milano

May - July 2016: Visiting scientist at the King Abdullah University of Science and Technology (KAUST) - Thuwal (Kingdom of Saudi Arabia) (host: Prof. Pierre MAGISTRETTI)

May 2009 – December 2015: Referent scientist of the Cellular Imaging Platform of Fondazione Filarete – Milan, Italy

RESEARCH ACTIVITIES:

1988-1994 – Reproductive biology

- Analysis of the structure and composition of the egg envelope of some species of freshwater and marine teleost fishes and their involvement and role during fertilization. We performed parallel studies on the biochemical and morphological/ultrastructural changes occurring in the oocytes of several freshwater teleost fishes after their release into water.
- The interaction between sperm cells and exogenous plasmid DNA. Studies about the possibility to introduce exogenous DNA into eggs at fertilization using sperm cells as vectors, thus producing transgenic animals. To this end the mechanism of interaction and further internalization of exogenous molecules into sperm cells and nuclei were extensively studied at the ultrastructural level after labelling plasmid DNA first with a radioactive tag (^3H) and autoradiographic detection then with digoxigenin and its further detection with post-embedding immunogold experiments. At that time we focused our attention on putative “receptors” for nucleic acids on the sperm plasma membrane and on the association of exogenous molecules with the scaffolding proteins of the sperm nucleus. These studies were carried on in mammals (mice, bovine and pig) and fish (*Cyprinus carpio*).

1995- present - Cellular Biology and Pharmacology

- Analysis on the effect of different Microtubule Associated Proteins (MAPs) on the kinetic of polymerization of microtubules *in vitro*.
- Localization of the protein Neuronal Calcium Sensor-1 (NCS-1) in cultured transfected cells. How NCS-1 can influence exocytosis through its interaction with PI4Kb in the cytoplasm of neurons and its further translocation to cell membranes. Subcellular localization of NCS-1 was performed through immuno-gold experiments on cryosection of both cultured cells and brains from adult mice.
- Endoplasmic reticulum plasticity in response to protein overexpression in cultured cells.
- Analysis of the effects of ALS-linked SOD1 and VAP-B mutations on the architecture of intracellular organelles (mitochondria and endoplasmic reticulum) in neuronal and non-neuronal cultured cell.

1996- present – Neuroscience and neurodegeneration

- Effects of medium and long-term denervation on the neuromuscular junction: modifications in the shape, ultrastructure, acetylcholine receptors localization, density, half-life.
- Analysis of agrin on the development of the neuromuscular junction and its ability to induce *in vivo* formation of clusters of extra-junctional AChRs in both innervated and denervated muscles fibers as well as in denervated, electrically stimulated muscle fibers.
- Role of the neurotrophin in the regulation of the structure of the neuromuscular junction.
- Analysis of motor-neurons, neuromuscular junctions and muscle fibers in animal models of Amyotrophic Lateral Sclerosis (ALS) upon pharmacological treatments with anabolic steroid Nandrolone (in the SOD1 G93A mouse) or Riluzole (in the SOD1 G93R zebrafish).
- Structure and function of central synapses from brain purified fractions, primary neuronal cultures and brain tissues of mice and rats. Quantitative study of synapses and dendrites in murine models of neurodevelopmental disorders (the TM4SF2 KO mouse as model for X-linked intellectual disability; the Myr7 ^{+/-} mice as model for the Bardet-Biedl Syndrome) by means of transmission electron microscopy and 3D reconstruction and volume measurements.

2009- present – Development of devices and protocols

Development of new substrates for Correlative Microscopy between confocal microscopy and scanning electron microscopy.

Development of new protocols for Correlative Microscopy for the detection of cell surface antigens labelled with fluorescent tags for confocal and gold particles for scanning electron microscopy.

PUBLICATIONS (2010-2018)

Prando V, Da Broi F, Franzoso M, Plazzo AP, Pianca N, **Francolini M**, Basso C, Kay MW, Zaglia T, Mongillo M. Dynamics of neuro-effector coupling at *cardiac sympathetic* synapses. *J Physiol*. 2018 Mar 10. doi: 10.1113/JP275693

Cappello V, **Francolini M** (2017) Neuromuscular Junction Dismantling in Amyotrophic Lateral Sclerosis. *Int J Mol Sci*. 2017 18(10). pii: E2092. doi: 10.3390/ijms18102092

Murru L, Vezzoli E, Longatti A, Ponzoni L, Falqui A, Folci A, Moretto E, Bianchi V, Braida D, Sala M, D'Adamo P, Bassani S, **Francolini M**, Passafaro M. (2017) Pharmacological Modulation of AMPAR Rescues Intellectual Disability-Like Phenotype in Tm4sf2-/- Mice. *Cereb Cortex*. 2017 27(11):5369-5384. doi: 10.1093/cercor/bhx221

Campostrini G, Bonzanni M, Lissoni A, Bazzini C, Milanese R, Vezzoli E, **Francolini M**, Baruscotti M, Bucchi A, Rivolta I, Fantini M, Severi S, Cappato R, Crotti L, J Schwartz P, DiFrancesco D, Barbuti A. (2017) The

expression of the rare caveolin-3 variant T78M alters cardiac ion channels function and membrane excitability. *Cardiovasc Res.* 2017 113(10):1256-1265. doi: 10.1093/cvr/cvx122

Benedetti L, Ghilardi A, Prosperi L, **Francolini M**, Del Giacco L. (2017) Biosensing Motor Neuron Membrane Potential in Live Zebrafish Embryos. *J Vis Exp.* 2017 (124). doi: 10.3791/55297

Zapata J, Moretto E, Hannan S, Murru L, Longatti L, Mazza D, Benedetti L, Fossati M, Heise C, Ponzoni L, Valnegri P, Braida D, Sala M, **Francolini M**, Hildebrand J, Kalscheuer V, Fanelli F, Sala C, Bettler B, Bassani S, Smart T, and Passafaro M. (2017) Epilepsy and intellectual disability linked protein Shrm4 interaction with GABABRs shapes inhibitory neurotransmission. *Nature Comm.* 2017 8:14536. doi: 10.1038/ncomms14536

Benedetti L, Ghilardi A, Rottoli E, De Maglie M, Prosperi L, Perego C, Baruscotti M, Bucchi A, Del Giacco L, **Francolini M**. (2016) INaP selective inhibition reverts precocious inter- and motorneurons hyperexcitability in the Sod1-G93R zebrafish ALS model. *Sci Rep.* 2016 Apr 15;6:24515

Heise C, Taha E, Murru L, Ponzoni L, Cattaneo A, Guarnieri FC, Montani C, Mossa A, Vezzoli E, Ippolito G, Zapata J, Barrera I, Ryazanov AG, Cook J, Poe M, Stephen MR, Kopanitsa M, Benfante R, Rusconi F, Braida D, **Francolini M**, Proud CG, Valtorta F, Passafaro M, Sala M, Bachi A, Verpelli C, Rosenblum K, Sala C. (2016) eEF2K/eEF2 Pathway Controls the Excitation/Inhibition Balance and Susceptibility to Epileptic Seizures. *Cereb Cortex.* 2016 Mar 21.

Folci A., Murru L., Vezzoli E., Ponzoni L., Longo F., Moretto E., Gerosa L., Zapata J., Braida D., Pistillo F., Bähler M., **Francolini M.**, Sala M, Bassani S. (2016) Myosin 9a binds AMPAR and regulates synaptic structure, LTP and cognitive function. *Front Mol Neurosci.* 2016 Jan 20;9:1

Gregori M, Bertani D, Cazzaniga E, Orlando A, Mauri M, Bianchi A, Sesana S, Minniti S, **Francolini M**, Cagnotto A, Salmons M, Nardo L, Salerno D, Mantegazza F, Masserini M, Simonutti R. (2015) Functionalized poly(*N,N*-dimethylacrylamide)-*block*-polystyrene nanoparticles as potential drug delivery system to overcome the blood brain barrier. *Macromol Biosci.* 2015 Dec;15(12):1687-97

Rodighiero S, Torre B, Sogne E, Ruffilli R, Cagnoli C, **Francolini M**, Di Fabrizio E, and Falqui A. (2015) Correlative Scanning Electron and Confocal Microscopy Imaging of Labeled Cells coated by Indium-Tin-Oxide. *Micr. Res. and Tech.* 78(6).433-443

Benedetti L, Sogne E, Rodighiero S, Marchesi D, Milani P, **Francolini M**. (2014) Customized patterned substrates for highly versatile correlative light-scanning electron microscopy. *Sci Rep.* 2014 Nov 13;4:7033. doi: 10.1038/srep07033

Bazzini C, Benedetti L, Civello D, Zanoni C, Rossetti V, Marchesi D, Garavaglia ML, Paulmichl M, **Francolini M**, Meyer G, Rodighiero S. (2014) ICLn: a new regulator of non-erythroid 4.1R localisation and function. *PLoS One.* 2014 Oct 8;9(10):e108826. doi: 10.1371/journal.pone.0108826. eCollection 2014.

Ruiz A., Joshi P., Mastrangelo R., **Francolini M.**, Verderio C., Matteoli M. (2014) Testing Ab toxicity on primary CNS cultures using drug-screening microfluidics chips. *Lab Chip*, 7;14(15):2860-6. doi: 10.1039/c4lc00174e. Epub 2014 Jun 10

Fossati M., Borgese N., Colombo SF., **Francolini M**. (2014) Visualization of Endoplasmic Reticulum Subdomains in Cultured Cells. *J. Vis. Exp.* (84), e50985, doi:10.3791/50985

Pischedda F., Szczyrkowska J., Cîrnaru D., Giesert F., Vezzoli E., Ueffing M., Sala C., **Francolini M.**, Hauck SM., Cancedda L., Piccoli G. (2013) A cell surface biotinylation assay to reveal membrane associated

neuronal cues: Negr1 regulates dendritic arborization. *Mol Cell Proteomics*. 2014 Mar;13(3):733-48. doi: 10.1074/mcp.M113.031716. Epub 2013 Dec 31

Menna E, Zambetti S, Morini R, Donzelli A, Disanza A, Calvigioni D, Braida D, Nicolini C, Orlando M, Fossati G, Cristina Regondi M, Pattini L, Frassoni C, **Francolini M**, Scita G, Sala M, Fahnstock M, Matteoli M. (2013) Eps8 controls dendritic spine density and synaptic plasticity through its actin-capping activity. *EMBO J*. 12;32(12):1730-44

Cappello V, Vezzoli E, Righi M, Fossati M, Mariotti R, Bentivoglio M, Pietrini G, **Francolini M**. (2012) "Analysis of neuromuscular junctions and effects of nandrolone administration in a mouse model for ALS" *Mol Cell Neurosci* 51(1-2): 12-21.

Verderio C, Muzio L, Turola E, Bergami A, Novellino L, Ruffini F, Riganti L, Corradini I, **Francolini M**, Garzetti L, Maiorino C, Servida C, Vercelli A, Dalla Libera D, Martinelli V, Comi G, Martino G, Matteoli M, Furlan R. (2012): "Myeloid microvesicles are a marker and therapeutic target for neuroinflammation" *Ann. Neurol*. 72(4): 610-624.

Papiani G, Ruggiano A, Fossati M, Raimondi A, **Francolini M**, Benfante R, Navone F, Borgese N. (2012): "Restructured endoplasmic reticulum, generated by mutant amyotrophic lateral sclerosis-linked VAPB, is cleared by the proteasome". *J. Cell Sci*. 125(15): 3601-3611.

Costantini LM, Fossati M, **Francolini M**, Snapp EL. (2012): "Assessing the tendency of fluorescent proteins to oligomerize under physiologic conditions". *Traffic* 13(5): 643-649.

Verderio C, Cagnoli C, Bergami M, **Francolini M**, Schenk U, Colombo A, Riganti L, Frassoni C, Zuccaro E, Danglot L, Wilhelm C, Galli T, Canossa M, Matteoli M. (2011): "TI-VAMP/VAMP7 is the snare of secretory lysosomes contributing to ATP secretion from astrocytes". *Biol. Cell*. 104(4): 213-228.

Bolliger MF, Zurlinden A, Lüscher D, Bütikofer L, Shakhova O, **Francolini M**, Kozlov SV, Cinelli P, Stephan A, Kistler AD, Rüllicke T, Pelczar P, Ledermann B, Fumagalli G, Gloor SM, Kunz B, Sonderegger P. (2010): "Specific proteolytic cleavage of agrin regulates maturation of the neuromuscular junction" *J Cell Sci*. 123(22):3944-55

Obermuller S, Calegari F, King A, Lindqvist A, Lundqvist I, Salehi A, **Francolini M**, Rosa P, Rorsman P, Huttner WB and Barg S (2010): "Defective secretion of islet hormones in chromogranin-B deficient mice" *PLoS ONE* 5(1): e8936

Linetti A, Fratangeli A, Taverna E, Valnegri P, **Francolini M**, Cappello V, Matteoli M, Passafaro M and Rosa P (2010): "Cholesterol but not sphingolipids reduction impairs synaptic vesicles exocytosis" *J. Cell Sci*. 2010 123(4):595-605

Fasana E, Fossati M, Ruggiano A, Brambillasca S, Hoogenraad CC, Navone F, **Francolini M**, Borgese N (2010) "A VAPB mutant linked to amyotrophic lateral sclerosis generates a novel form of organized smooth endoplasmic reticulum" *FASEB J*. 2010 24(5): 1419-1430

Lavazza C, Carlo-Stella C, Giacomini A, Cleris L, Righi M, Sia D, Di Nicola M, Magni M, Longoni P, Milanesi M, **Francolini M**, Gloghini A, Carbone A, Formelli F, Gianni AM. (2010) "Human CD34+ cells engineered to express membrane-bound tumor necrosis factor-related apoptosis-inducing ligand (TRAIL) target both tumor cells and tumor vasculature." *Blood* 2010 115(11):2231-2240