Curriculum vitae et studiorum

Personal information

Name, surname:	Emilia, Conti
Place and date of birth:	Florence, Italy, July 18th 1987.
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Current position

2020-present Postdoctoral research fellow, Neuroscience Institute, National Research Council
Pisa, Italy.

Letters of employment: Prot. 0004712, 21/10/2020 (1/11/2020-31/10/2021)
Prot. 0004181, 07/10/2021(1/11/2021-31/10/2022)
Prot. 0004708,19/10/2022 (1/11/2022-31/10/2023)

Previous positions

2018-2020 Postdoctoral research fellow, Dept. of Physics and Astronomy, University of Florence
Sesto Fiorentino (FI), Italy.

Letters of employment: Prot. 178978, 25/10/2018 (1/11/2018 - 31/10/2019)
Prot. 201339, 05/11/2019 (1/11/2019 - 31/10/2020)

2015-2018 Graduate student, European Laboratory for Non-linear Spectroscopy (LENS)
Sesto Fiorentino (FI), Italy.

Education

2015-2018 PhD in Biophysics, European Laboratory for Non-linear Spectroscopy (LENS)
Sesto Fiorentino (FI), Italy.
PhD thesis: "In vivo optical imaging of cortical plasticity induced by rehabilitation after stroke", supervisor Dr. Anna Letizia Allegra Mascaro and Prof. Francesco Saverio Pavone.

2012-2015 Master's degree in Biology, University of Florence
Florence, Italy.
Master thesis: *"In vivo structural and functional plasticity in an ischemia mouse model"*, supervisor Prof. Francesco Saverio Pavone.
Final grade: 110/110, *magna cum laude*.

2007-2012 Bachelor's degree in Biological Sciences, University of Florence
Florence, Italy.
Bachelor thesis: *"Evaluation of the presence of lymphatic endothelial progenitor cells in Crohn's disease patients"*, supervisor Prof. Annarosa Arcangeli.
Final grade: 107/110.

Research activity

2012 **University of Florence (Italy), Dept. of Experimental Pathology and Oncology**
Under the supervision of Professor. Anna Rosa Arcangeli and Dr. Elena Lastraioli.
I performed a cytofluorimeter analysis to identify the presence of endothelial progenitors cell in blood samples of Crohn's disease patients.

2014-2015 **University of Florence (Italy), Biophotonics group at LENS**.
Under the supervision of Prof. Francesco S. Pavone and Dr. Anna Letizia Allegra Mascaro. During my master thesis I have acquired basic notions of optics. I have learned mouse handling and mouse surgery techniques (i.e. photothrombotic stroke, cranial window preparations, intra-cortical injections of Adeno Associated Virus). I performed longitudinal two-photon imaging on Thy1-GFPm mice to investigate the structural plasticity of synaptic terminals.

2015-2018 **European Laboratory for Non-linear Spectroscopy (Italy), Biophotonics group**.
Under the supervision of Professor Pavone and Dr. Anna Letizia Allegra Mascaro.
During my PhD thesis I have exploited several imaging techniques to investigate structural and functional plasticity in a mouse model of stroke. In particular, I compared the effects of different rehabilitative therapies (i.e. robotic platform motor training, contralateral inhibition through intra-cortical injection of botulin neurotoxin, and the combination of those two strategies) in promoting functional recovery.
I performed in vivo two-photon imaging to dissect spines turnover both in peri-infarct and more distal cortical regions of Thy1-GFPm mice. In parallel, by employing wide-field fluorescence imaging on thy1-GCaMP6f mice executing a pulling task, I investigated alterations of functional connectivity induced by stroke. Finally, by applying optogenetic stimulation and simultaneous recording of the elicited cortical activity with a wide-field microscope, I investigated how cortical stroke affects the interhemispheric connectivity with respect to healthy conditions.

2018-2020 **University of Florence (Italy), Dept. of Physics and Astronomy**.
During my post-Doc, I designed a novel post-stroke rehabilitative protocol combining ipsilesional optogenetic stimulation of the periinfarct area with motor training. I used a widefield microscope provided with a double illumination path to perform in vivo calcium imaging over a large field of view and optogenetic stimulation. I performed longitudinal two-photon imaging of cortical mouse vasculature to estimate blood vessel permeability to dyes of different molecular weight injected in the mouse tail vein. I executed ex vivo immunostaining and confocal imaging of fixed brain section to quantify the lesion volume and to investigate the expression of plasticity markers. Furthermore, I conducted behavioral experiments on mice (e.g. Schallert test) to characterize stroke-induced functional impairment. Finally, I performed image processing and analysis using common software (e.g. ImageJ, Origin Pro).

2020-present **Neuroscience Institute, National Research Council (Italy)**.
I developed and characterized a novel experimental model of stroke targeted to a large blood cerebral vessel (e.g. the middle cerebral artery) in mice. This method employing light to induce both the occlusion (532 nm) and subsequent recanalization (365 nm) of the vessel, provides a highly reproducible cerebral damage better resembling features of clinical stroke. By taking advanced of two-photon imaging, I'm investigating how the structural reorganization of neurons at the cellular and subcellular level correlates with the extravasation and with the levels of circulating biomarkers at different time points after stroke.

Training

2021 Elementi base per l'approccio dei ricercatori all'utilizzo degli animali ai fini scientifici, Istituto Zooprofilattico Sperimentale della Lombardia dell'Emilia Romagna.

2019 Use and care of laboratory animals, Centro di Servizi per la Stabulazione Animali da Laboratorio (CeSAL) University of Florence.

Awards

2018 Travel grant Optics and the Brain conference talk: All-Optical Rehabilitation Promotes Motor Recovery in a Mouse Model of Stroke

Co-supervisor

2021-present PhD student co-supervisor XXXVII doctorate cicle, European Laboratory for Non-linear Spectroscopy, Sesto Fiorentino (Italy), project "Multi-depth all-optical investigation of functional plasticity in a mouse model of stroke", Francesca Silvestri.

Teaching activity

2021 and 2022 *"Aspetti traslazionali della ricerca sull'ictus acuto: progetti in corso nella AOUC"* Course "Ictus ischemico acuto: dal laboratorio al letto del malato" part of the Annual Education Program of the Azienda Ospedaliero Universitaria Careggi

Conference Chair

2nd Brayn Conference, Milan (Italy), 14.11.2019-16.11.2019
Session "Neural plasticity"

1st Translational Research on Stroke (TREES) Meeting: Hot topics in acute stroke: from bench to bedside and back again, Webinar, 19.10.2021
Session "In vivo imaging in preclinical stroke research"

2nd Translational Research on Stroke (TREES) Meeting, Florence (Italy), 25.11.2022
Session "Neuroimaging markers of reperfusion and recovery after stroke"

Publications

Since 2018 I have published 11 papers, 6 of which as first author, in the Neuroscience field in peer review journals. Furthermore, I have published 1 book chapter and 8 conference proceedings (3 as first author).

My articles received globally 72 citations (Scopus), resulting in an h-index of 5 (Scopus).

Peer-reviewed articles

[11] **Conti, E.***, Carlini, N., Piccardi, B., Allegra Mascaro A.L., Pavone S.F., *"Photothrombotic middle cerebral artery occlusion in mice: a novel model of ischemic stroke",* 2023, eNeuro in press. doi: 10.1523/ENEURO.0244-22.2022.
* Corresponding author.

[10] Kreuz, T., Senocrate, F., Cecchini, G., Checcucci, C., Allegra Mascaro, A.L., **Conti, E.**, Scaglione, A., Pavone, F.S., *"Latency correction in sparse neuronal spike trains",* 2022, Journal of Neuroscience Methods 6 381:109703. doi: 10.1016/j.jneumeth.2022.109703.

[9] Scaglione, A.§, **Conti, E. §**, Allegra Mascaro, A.L., Pavone, F.S., *"Tracking the effect of therapy with single-trial based classification after stroke",* 2022, Frontiers in Systems Neuroscience doi: 10.3389/fnsys.2022.840922.
§ First author with equal contribution.

[8] **Conti, E.**, Piccardi, B., Sodero, A., Tudisco, L., Lombardo, I., Fainardi, E., Nencini, P., Sarti, C., Allegra Mascaro, A.L., Baldereschi, M., *"Translational Stroke Research Review: Using the Mouse to Model Human Futile Recanalization and Reperfusion Injury in Ischemic Brain Tissue",* 2021, Cells 10 3308 doi: 10.3390/cells10123308.

[7] **Conti, E.**, Scaglione A., de Vito G., Calugi F., Pasquini M., Pizzorusso T., Micera S., Allegra Mascaro A.L., Pavone F.S. *"Combining optogenetic stimulation and motor training improves functional recovery and perilesional cortical activity",* Neurorehabilitation and Neural Repair, 2021; 1-12, doi: 10.1177/15459683211056656.

[6] Cecchini, G., Scaglione, A., Allegra Mascaro, A.L., Checcucci, C., **Conti, E.**, Adam, I., Fanelli, D., Ulivi, R., Pavone, F.S., Kreuz, T., "*Cortical propagation tracks functional recovery after stroke",* 2021, Plos Computational Biology,17(5), doi: 1008963.

[5] Adam, I., Cecchini, G., Fanelli, D., Kreuz, T.,Livi, R., diVolo, M., Allegra Mascaro, A.L., **Conti, E.**, Scaglione, A., Silvestri, L., Pavone F.S., *" Inferring network structure and local dynamics from neuronal patterns with quenched disorder",* 2020, Chaos, Solitons & Fractals, Volume 140, 110235, doi: 2020.110235.

[4] Allegra Mascaro, A.L., Falotico, E., Petkoski, S., Pasquini, M., Vannucci, L.,Tort-Colet, N., **Conti, E.**, Resta, F.,Spalletti, C., Ramalingasetty, S.T., von Arnim, A., Formento, E., Angelidis, E., Blixhavn, C., B. Leergaard, T., Caleo, M., Destexhe, A., Ijspeert, A., Micera, S., Laschi, C., Jirsa, V., Gewaltig, M.O., Pavone F.S., *"Experimental and Computational Study on Motor Control and Recovery After Stroke: Toward a Constructive Loop Between Experimental and Virtual Embodied Neuroscience",* 2020, Frontiers in Systems Neuroscience, 14:31, doi: 10.3389/fnsys.2020.00031.

[3] Allegra Mascaro, A.L[§], **Conti, E.[§]**, Lai, S. DI Giovanna, A.P., Spalletti, C., Alia, C., Panarese, A., Scaglione, A., Sacconi, L., Micera, S., Caleo, M., Pavone F.S., *"Combined Rehabilitation Promotes the Recovery of Structural and Functional Features of Healthy Neuronal Networks after Stroke",* 2019, Cell Reports, Vol 8, Issue 13, doi: 2019.08.062.
[§] First author with equal contribution

[2] **Conti, E.**, Allegra Mascaro A.L., Pavone F.S., *"Large Scale Double-Path Illumination System with Split Field of View for the All-Optical Study of Inter-and Intra-Hemispheric Functional Connectivity on Mice",* 2019, Methods and Protocols, 2(1):11, doi: 10.3390/mps2010011.

[1] Montagni, E., Resta, F., **Conti, E.**, Scaglione A., Pasquini M., Micera S., Allegra Mascaro A.L., Pavone F.S., *"Wide-field imaging of cortical neuronal activity with red-shifted functional indicators during motor task execution",* 2018, Journal of Physics D: Applied Physics 52.7 (2018): 074001, doi: 10.1088/1361-6463/aaf26c.

Book

Conti, E., Allegra Mascaro A.L., Pavone F.S., Chapter *"In vivo imaging of the structural plasticity of cortical neurons after stroke"* in Neural Repair: Methods and Protocols, 2023, ISBN 1071629255 Springer US.

Conference proceedings

[8] **Conti, E.**, Allegra Mascaro, A.L., Francesco Resta, Alessandro Scaglione, Maria Pasquini, Micera, S., M., Pavone, F.S., *"Combined rehabilitation promotes recovery of motor functionality in a mouse model of stroke",* 2019, Proc. SPIE, Neurophotonics; doi: 12.2508321.

[7] Montagni, E., Resta, F., **Conti, E.**, Pasquini, M., Mascaro, A.L.A., Pavone, F.S., *"Imaging of cortical neuronal-activity with red-shifted functional indicators during motor task execution"*, 20th Italian National Conference on Photonic Technologies (Fotonica 2018), Lecce, Italy; 23-25 May 2018. IET Conference Publications, 2018 (CP748); doi: 10.1049/cp.2018.1653.

[6] **Conti, E.**, Mascaro, A.L.A., Resta, F., Scaglione,A., Pasquini, M., Micera, S., M., Pavone, F.S., *"All-Optical Rehabilitation Promotes Motor Recovery in a Mouse Model of Stroke",*

Optics and the Brain 2018, Hollywood, Florida United States, 3–6 April 2018. Optics InfoBase Conference Papers, Part F88-BRAIN 2018; doi: 10.1364/BRAIN.2018.BTh2C.2.

[5] Resta, F., **Conti, E.**, Montagni E., Sacconi L., Mascaro, A.L.A., Pavone, F.S*., "All-Optical Simultaneous Stimulation and Readout of Motor Cortex Activity in Awake Mice"*, Clinical and Translational Biophotonics 2018, Hollywood, Florida United States, 3–6 April 2018. Optics InfoBase Conference Papers, Part F91-TRANSLATIONAL 2018; doi: 10.1364/TRANSLATIONAL.2018.JTu3A.47.

[4] Allegra Mascaro, A.L., **Conti, E.,** Lai, S., Spalletti, C., Di Giovanna, A.P. Alia, C., Panarese, A., Sacconi, L., Micera, S., Caleo, M., Pavone, F.S., "*Multi-scale optical investigation of robotic rehabilitation-induced cortical plasticity after stroke"*, Optics and the Brain 2017, San Diego, California United States, 2–5 April 2017 Optics InfoBase Conference Papers, Part F76-BRAIN 2017; doi: 10.1364/BRAIN.2017.BrW3B.4.

[3] Allegra Mascaro, A.L., Spalletti, C., Lai, S., **Conti, E.**, Alia, C., Sacconi, L., Micera, S., Caleo, M., Pavone, F.S., "*Multi-level imaging of brain plasticity after stroke*", Optics and the Brain 2016, Fort Lauderdale, Florida United States, 25–28 April 2016. Optics InfoBase Conference Papers doi: 10.1364/BRAIN.2016.BTh3D.3.

[2] **Conti, E.**, Allegra Mascaro, A.L., Spalletti, C., Lai, S., Alia, C., Sacconi, L., Micera, S., Caleo, M., Pavone, F.S., "Multi-modal optical imaging of brain plasticity after stroke", 2016, 18th Italian National Conference on Photonic Technologies (Fotonica 2016), IET Conference Publications, doi: 10.1049/cp.2016.0924.

[1] Allegra Mascaro, A.L, Spalletti, C., Lai, S., **Conti, E.**, Alia, C., Sacconi, L., Micera, S., Caleo, M., Pavone, F.S., "Multi scale morpho-functional characterization of damage and rehabilitation after stroke", Proc. Optics InfoBase Conference Papers, doi: 10.1364/FIO.2016.FTh4D.1.

Conferences

Talks

[7] *"Modeling stroke-related cerebral edema"*, 2nd Translational Research on Stroke (TREES) Meeting, Florence (Italy), 2022.

[6] *"Ischemic stroke and recanalization"*, 2nd Translational Research on Stroke (TREES) Meeting, Florence (Italy), 2022.

[5] *"STROKELAB2BED and NIMBLE projects in a nutshell and preliminary results"*, 1st Translational Research on Stroke (TREES) Online Meeting: Hot topics in acute stroke: from bench to bedside and back again, 2021.

[4] *"Optical manipulation of neural activity combined with longitudinal motor training enhances functional recovery after stroke"*, Neuroscience Institute (CNR) Online Retreat 2020.

[3] *"All-optical rehabilitation promotes functional remodeling in a mouse model of stroke"*, Biophotonics Congress: Biomedical Optics Congress 2018, Fort Lauderdale (FL, USA), 2018.

[2] *"Multi-modal optical imaging of brain plasticity after stroke"*, Fotonica 2016, 18th Italian National Conference on Photonic Technologies, Rome (Italy), 2016.

[1] *"Optical imaging of brain plasticity after stroke"*, New perspective in Neuroscience: Research Results of Young Italian Neuroscientists (SINS), Naples (Italy), 2016.

Posters

[7] *"A novel photothrombotic model of occlusion-recanalization of MCA in mice"*, Neuroscience Institute (CNR) Retreat, Santa Margherita di Pula, Cagliari (Italy), 2022.

[6] *"Generalized recovery of motor functionality after stroke by combined ipsi-lesional excitation and motor training"*, 2nd Brayn Conference, Milan (Italy), 2019.

[5] *"Synergic effect of intensive motor training and optogenetic stimulation promotes recovery of motor functionality in a mouse model of stroke"*, 18th Brain Ischemia and Stroke conference, Rome (Italy), 2018.

[4] *"Optogenetic rehabilitation promotes functional remodeling after stroke"*, ICOBSI, International Conference on Bio Sensing and Imaging, Florence (Italy), 2018.

[3] *"Optogenetic rehabilitation combined with motor training promotes functional recovery in a mouse model of stroke"*, 11th FENS – Forum of Neuroscience, Berlin (Germany), 2018.

[2] *"Optogenetic rehabilitation promotes functional remodeling after stroke: an in vivo imaging study"*, Neuroscience 2017, Society for Neuroscience's 47th annual meeting, Washington (DC, USA), 2017.

[1] *"Robotic rehabilitation promotes stabilization of peri-infarct cortical circuits and inter-hemispheric connectivity: in vivo study in structural and functional plasticity"*, Neuroscience 2016, Society for Neuroscience's 46th annual meeting, San Diego (CA, USA), 2016.

Memberships

2016-present Society for Neuroscience (SfN)
2020-present Translational Research on Stroke (TREES) group

Service

Reviewer

I served as reviewer for Applied Sciences (MPDI) journal and I'm review editor for Mechanisms, Models and Biomarkers of Stroke for the journal Frontiers in Stroke.

Third mission activity

2019 *"Microscopy in the Neuroscience"*, ScienzEstate 2019, European Laboratory for Non-linear Spectroscopy, Sesto Fiorentino (Italy). Lab experiences, for families and kids, focused on fluorescence and its applications in neuroscience.

02.02.2023

Emilia Conti