

ALLEGATO B

UNIVERSITÀ DEGLI STUDI DI MILANO

selezione pubblica per n.1 posto/i di Ricercatore a tempo determinato ai sensi dell'art.24, comma 3, lettera b) della Legge 240/2010 per il settore concorsuale 05/D1 - FISILOGIA, settore scientifico-disciplinare BIO/09 - FISILOGIA presso il Dipartimento di Bioscienze, (avviso bando pubblicato sulla G.U. n. 7 del 26/01/2021) Codice concorso 4515

[Federico Brandalise] CURRICULUM VITAE

INFORMAZIONI PERSONALI (NON INSERIRE INDIRIZZO PRIVATO E TELEFONO FISSO O CELLULARE)

COGNOME	BRANDALISE
NOME	FEDERICO
DATA DI NASCITA	13/04/1986

INSERIRE IL PROPRIO CURRICULUM (non eccedente le 30 pagine)

PERSONAL INFORMATION

FEDERICO BRANDALISE

D.O.B.

13.04.1986

Address

University of Geneva, Department of Fundamental Neuroscience (NEUFO), Rue Michel Servet 1, 1211 Geneve 4

E-mail federico.brandalise@unige.ch

Google Scholar ID: Federico Brandalise

Scopus ID: Brandalise, Federico

EDUCATION

06/2013 – 12/2016 (PhD defence 29/08/2016 – PhD advisors: Fritjof Helmchen and Urs Gerber)

PhD in neuroscience

University of Zurich - Brain Research Institute. Winterthurerstrasse 190, 8057 Zürich (CH)

Thesis title: The Dendritic NMDA Spike as a Fundamental Mechanism Initiating Associative Plasticity in the CA3 Region of the Hippocampus

5/10/2009 – 26/06/2013

Master Degree in Neurobiology

University of Pavia, Via Forlanini 6, 27100, Pavia (IT)

Thesis title: Synaptic cross-talk between granule cells and Golgi cells through GABA_B mediated modulation of GABA_A-dependent neurotransmission in the cerebellum.

1/10/2005 – 22/09/2008

Bachelor Degree in Human Biology and Biomedical Science

University of Pavia, Via Forlanini 6, 27100, Pavia (IT)

Thesis title: The NR2A subunit of the N-methyl D-aspartate receptor is required for potentiation at the cerebellar mossy fiber to granule cell synapse and vestibulo-cerebellar motor learning.

EMPLOYMENT HISTORY AND INSTITUTIONAL RESPONSABILITIES

10/2018 – ongoing

Post-Doctoral Fellowship

University of Geneva, Department of Fundamental Neuroscience (NEUFO) {Anthony Holtmaat lab}

Project Title: POM learning-related modulation of active S1 cortical dendrites during a texture-discrimination task.

Skills: Intracranial injections of viral constructs, cranial windows for brain *in-vivo* imaging, 2P-calcium imaging.

01/2017 – 09/2018

Post-Doctoral Fellowship

University of Texas at Austin - Center for Learning and Memory. 100 East 24th St., 78712 Austin (TX) {Daniel Johnston lab}

Project Title: Dynamics and Plasticity of Dendritic Signaling in the Prefrontal Cortex of a Fragile X Syndrome Mouse Model

Skills: Dendritic patch clamp recordings in mPFC and hippocampus. Single channel recordings. Behavioral investigation of delayed eye-blink conditioning paradigm.

06/2013 – 08/2016

PhD in neuroscience

University of Zurich, Brain Research Institute, Laboratory of Electrophysiology. Winterthurerstrasse 190, 8057 Zürich (CH) {Urs Gerber lab and Fritjof Helmchen lab}

Main goal: to understand the circuits involved in processing synaptic inputs in the hippocampus by using an electrophysiological and imaging approach. In particular, I have examined the integration of diverse inputs onto CA3 pyramidal cells and how these inputs converge to generate dendritic spikes.

Skills: Patch clamp recording from neurons in organotypic cultures and acute slices of hippocampus, cerebellum, and amygdala. Double recording from soma and dendrite of the same CA3 pyramidal cell. Perforated patch clamp. Cell-attached patch clamp. Calcium imaging. Two-photon calcium imaging.

12/2010 - 05/2013

Master Thesis in Neurobiology

University of Pavia, Laboratory of Electrophysiology. Via Forlanini 6, 27100 Pavia (IT) {Prof. Paola Rossi and Prof. Egidio D'Angelo}

Main goal: investigating neuronal and synaptic properties involved in cerebellar learning, with a major focus on synaptic plasticity at the level of granule cells and Golgi cells. I have been studying the development of cerebellar granule cells from the external granular layer (EGL) to the internal granular layer (IGL) in wild-type and in weaver mice (ataxia animal model).

Skills: Patch clamp recording of cerebellar granule cells in acute slices. Patch clamp in cultured stem cells.

06/2013 - 10/2014

Collaboration in electrophysiology and behavior

Miconet srl (start-up) - University of Pavia (Prof. Paola Rossi).

Main goal: to study the effects of natural extracts from the lion's mane mushroom (*Hericium erinaceus*) on mouse neuronal activity and behavior.

Skills: Electrophysiology (patch clamp in acute slices of hippocampus and entorhinal cortex, recording of spontaneous and evoked synaptic transmission). Behavioral tests (Y maze, radial maze, water maze, emerging test, open field). Molecular biology (real-time PCR, end-point PCR).

APPROVED RESEARCH PROJECTS

Dynamics and Plasticity of Synaptic Signaling at Identified Synapses in Hippocampus (Prof. Urs Gerber – Swiss National Science Foundation) 01.10.2012 - 30.09.2015 (staff member)

Dynamics and Plasticity of Dendritic Signaling in Hippocampal CA3 Pyramidal Cells (Prof. Urs Gerber – Swiss National Science Foundation) 01.10.2015 - 30.09.2017 (staff member)

Dynamics and Plasticity of Dendritic Signaling in the Prefrontal Cortex of a Fragile X Syndrome Mouse Model (Dr. Federico Brandalise - Swiss National Science Foundation) 01.01.2017 - 30.06.2018 (responsible applicant)

Fragile X Mental Retardation Protein (FMRP) modulates the functional membrane expression of HCN channel via protein-protein interaction: characterization of a novel regulatory mechanism.
(Dr. Federico Brandalise - Swiss National Science Foundation) 01.07.2018 - 30.09.2018 (responsible applicant)

TEACHING ACTIVITIES

Teaching assistant “BIO 434: Electrophysiological Recording Techniques” - University of Zurich (years 2013; 2014; 2015)

Lesson entitled: “The application of non-stationary fluctuation analysis to determine single channel’s properties” as part of the Cell Biophysics course at “Università degli Studi di Milano” (A.Y. 2020/2021)

MEMBERSHIPS

Swiss Society for Neuroscience
Society for Neuroscience

PRICES, AWARDS, FELLOWSHIPS

SSN Travel grant 2014

SNF “Early Post Doc Mobility Fellowship 2016”

SNF “Advanced Post Doc Mobility Fellowship 2018”

1st Prize at the HIFO PhD competition 2015 (Zurich, 03/2015)

3rd Prize “Best Poster Award” at the EMBO Conference “Dendritic Anatomy, Molecules and Function” (Crete, 06/2016)

SSN Travel grant 2017 (06/2017)

ZNZ Best PhD Dissertation Award 2017 (Zurich, 09/2017)

PERSONAL SKILLS

Language skills: Italian (native); English (highly proficient in spoken and written); German (good working knowledge); French (good working knowledge). Digital competences: Office, Corel Draw, Illustrator, Igor Pro, Prism, Clampfit, Clampex, Origin, ImageJ, HelioScan software, Matlab.

MAJOR SCIENTIFIC ACHIEVEMENTS

I became interested in neurophysiology as an undergraduate student, when I had the opportunity to spend two summers in the lab of Prof. E. D’Angelo and Prof. P. Rossi at the University of Pavia. I then completed my Master’s degree in this lab working on cerebellar synaptic physiology. For my PhD, I moved to the lab of Prof. U. Gerber at the Brain Research Institute at the University of Zurich, where I investigated how local synaptic depolarization can modulate synaptic strength and, under certain conditions, induce a NMDA spike. In our paper, we observed a strong correlation between the probability of evoking NMDA spikes and the induction of LTP. This idea has been subsequently corroborated *in vivo* (Gambino et al. 2014; Scheffeld & Dombek 2015; Chicon & Gan 2015). Moreover, I have obtained evidence of branch-dependent compartmentalization of dendritic spikes.

I have then worked as a post-doc in the Johnston lab at the University of Texas at Austin, where I described for the first time a novel protein-protein interaction modulated by FMRP and HCN channels that caused impaired regulation of dendritic integration both in the hippocampus and in medial prefrontal cortex.

Currently, in the Holtmaat lab, I am investigating how different inputs during a texture-discrimination task, converge into layer 2/3 in the barrel cortex and trigger supralinear events that are possibly involved in long term potentiation and memory.

PUBLICATIONS IN PEER-REVIEWED SCIENTIFIC JOURNALS

BACHELOR:

NR2A subunit of the N-methyl D-aspartate receptors are required for potentiation at the mossy fiber to granule cell synapse and vestibulo-cerebellar motor learning. Andreescu CE, Prestori F, **Brandalise F**, D'Errico A, De Jeu MT, Rossi P, Botta L, Kohr G, Perin P, D'Angelo E, De Zeeuw CI. *Neuroscience*. 2011 Mar 10;176:274-83. I.F. 3.327 <https://www.ncbi.nlm.nih.gov/pubmed/21185357>

MASTER:

Gene signatures associated with mouse postnatal hindbrain neural stem cells and medulloblastoma cancer stem cells identify novel molecular mediators and predict human medulloblastoma molecular classification. Corno D, Pala M, Cominelli M, Cipelletti B, Leto K, Croci L, Barili V, **Brandalise F**, Melzi R, Di Gregorio A, Sergi LS, Politi LS, Piemonti L, Bulfone A, Rossi P, Rossi F, Consalez GG, Poliani PL, Galli R. *Cancer Discov*. 2012 Jun;2(6):554-68. <https://www.ncbi.nlm.nih.gov/pubmed/22628409>

Golgi cell-mediated activation of postsynaptic GABAB receptors induces disinhibition of the Golgi cell– granule cell synapse in rat cerebellum. **Brandalise F**, Gerber U and Rossi P. *PLoS One*. 2012;7(8):e43417. doi: 10.1371/journal.pone.0043417. <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0043417>

PhD:

Mossy fiber-evoked subthreshold responses induce timing-dependent plasticity at hippocampal CA3 recurrent synapses.* **Brandalise F, Gerber U. *Proc Natl Acad Sci U S A*. 2014 Mar 18;111(11):4303-8. doi: 10.1073/pnas.1317667111 [Recommendation by Prof. Tomoki Fukai in F1000Prime]. <https://www.ncbi.nlm.nih.gov/pubmed/24550458>

Improving training condition assessment in endurance cyclists: effects of Ganoderma lucidum and ophiocordyceps sinensis dietary supplementation. Rossi P, Buonocore D, Altobelli E, **Brandalise F**, Cesaroni V, Iozzi D, Savino E, Marzatico F. *Evid Based Complement Alternat Med*. 2014;2014:979613. doi: 10.1155/2014/979613. <https://www.ncbi.nlm.nih.gov/pubmed/24799948>

Distinct molecular components for thalamic-and cortical-dependent plasticity in the lateral amygdala. Mirante O, **Brandalise F**, Bohacek J, Mansuy I. *Front Mol Neurosci*. 2014 Jul 3;7:62. doi: 10.3389/fnmol.2014.00062. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4080466/>

Fear is the mother of invention: anuran embryos exposed to predator cues alter life-history traits, post-hatching behaviour and neuronal activity patterns. Gazzola A*, **Brandalise F***, Rubolini D, Rossi P and Galeotti P*. *Journal of Experimental Biology* 218, no. 24(2015):3919-3930. ***these authors contributed equally to this work.** <https://www.ncbi.nlm.nih.gov/pubmed/26567349>

Inwardly rectifying potassium currents in cerebellar granule cells exhibit distinct ontogenetic expression in the hemispheres as compared to the vermis. **Brandalise F**, Lujan R, Leone R, Cesaroni V, Romano C, Gerber U and Rossi P. *European Journal of Neuroscience*, 43(11), 1460-1473. <https://www.ncbi.nlm.nih.gov/pubmed/26921581>

Dietary supplementation of Hericium erinaceus increases mossy fiber-CA3 hippocampal neurotransmission and recognition memory in wild-type mice
Federico Brandalise, Valentina Cesaroni, ... , Paola Rossi *Evidence-Based Complementary and Alternative Medicine*

Dendritic NMDA spikes are necessary for timing-dependent associative plasticity at synapses between hippocampal pyramidal cells.* **Brandalise F, Carta S, Helmchen F, Lisman J, Gerber U. *Nature Communications*, 7, 13480 <https://www.nature.com/articles/ncomms13480>

Dietary Supplementation of Lion's Mane Medicinal Mushroom, Hericium erinaceus (Agaricomycetes), and Spatial Memory in Wild-Type Mice. Paola Rossi, Valentina Cesaroni, **Federico Brandalise**, Alessandra Occhinegro, Daniela Ratto, Fabio Perrucci, Veralice Lanaia, Carolina Girometta, Germano Orrù, Elena Savino (2018). *International journal of medicinal mushrooms*, 20(5):485-494.

Conditioning by subthreshold synaptic input changes the intrinsic firing pattern of CA3 hippocampal neurons. Soldado-Magraner, S*, **Brandalise, F***, Honnuraiah, S., Pfeiffer, M., Moulinier, M., Gerber, U., & Douglas, R. (2019). Journal of neurophysiology, 123(1), 90-106. ***these authors contributed equally to this work.**

Squaring the Circle: A New Study of Inward and Outward-Rectifying Potassium Currents in U251 GBM Cells. Ratto, D., Ferrari, B., Roda, E., **Brandalise, F.**, Siciliani, S., De Luca, F., ... & Bottone, M. G. Cellular and Molecular Neurobiology (2019): 1-16.

Fragile X Mental Retardation Protein Bidirectionally Controls Dendritic Ih in a Cell Type-Specific Manner between Mouse Hippocampus and Prefrontal Cortex*. **Brandalise, F*, Brian E. Kalmbach*, Preeti M., Olivia T., D. Johnston, B. V. Zemelman, and D. H. Brager. "" Journal of Neuroscience 40, no. 27 (2020): 5327-5340.

Deeper and Deeper on the Role of BK and Kir4.1 Channels in Glioblastoma Invasiveness: A Novel Summative Mechanism? **Brandalise, F.**, Ratto, D., Leone, R., Olivero, F., Roda, E., Locatelli, C. A., ... & Rossi, P. (2020). Frontiers in Neuroscience, 14, 1237.

ORAL PRESENTATIONS IN CONFERENCES

Invited speaker:

- “Evolution and the brain” – University of Pavia, 10/2013
- “Decoding the brain’s sense of place” – University of Zurich, 10/2014
https://www.youtube.com/watch?v=00_nsjv17Co&t=35s
- “The NMDA-spike as a fundamental mechanism in timing-dependent plasticity at hippocampal CA3 recurrent synapses” – GIESSBACH NEUROSCIENCE MEETING 03/2014
- “The NMDA-spike as a fundamental mechanism in timing-dependent plasticity at hippocampal CA3 recurrent synapses” - Gordon Research Conference: “Dendrites: Molecules, Structure & Function” 03/2015 – Ventura (CA).
- “Fragile X Mental Retardation Protein bidirectionally controls dendritic Ih in a cell-type specific manner between mouse hippocampus and prefrontal cortex” - University of Padova; invited lecture hosted by Prof. Daniela Pietrobon 11/2019
- “Dendritic integration of long-range inputs by barrel cortex pyramidal cells” SWISSKERS MEETING (Bern-CH) 01/2020

POSTERS IN CONFERENCES

Synaptic activation of GABA_B receptors in granule cells reduces GABA_A receptor-mediated responses at the Golgi cell–granule cell synapse in rat cerebellum.
8th IBRO World congress of Neuroscience – Florence.

Subthreshold mossy fiber input can trigger synaptic plasticity between CA3 pyramidal cells.
Neuroscience meeting 2011 – Washington DC.

Cerebellar granule cells exhibit distinct developmental expression of voltage-dependent channels in the hemispheres as compared to the vermis.
FENS meeting 2014 – Milan.

Distinct developmental expression of G-protein coupled inwardly rectifying potassium (GIRK) channels in cerebellar granule cells in the hemispheres as compared to the vermis
Neuroscience meeting 11/2014 – Washington DC.

The NMDA-spike as a fundamental mechanism in timing-dependent plasticity at hippocampal CA3 recurrent synapses
Gordon Research Conference: “Dendrites: Molecules, Structure & Function” 03/2015 – Ventura (CA).

The NMDA-spike as a fundamental mechanism in timing-dependent plasticity at hippocampal CA3 recurrent synapses
Neuroscience meeting 10/2015 – Chicago.

Dendritic spike generation at CA3 pyramidal cells triggers LTP at recurrent synapses. SSN Annual Meeting 01/2016 – Lausanne.

Dendritic NMDA spikes are necessary for timing-dependent associative plasticity at recurrent synapses of CA3 hippocampal pyramidal cells

EMBO Conference “Dendritic Anatomy, Molecules and Function”, Crete (06/2016)

From full-blow spikes to graded boosting NMDA dendritic supralinearities: what causes the switch?

Neuroscience meeting 2016 – San Diego (CA).

Cell-type specific regulation of ion channel function by fragile x mental retardation protein

Neuroscience meeting 2017 – Washington (DC).

FMRP bidirectionally controls differentially regulates dendritic HCN in a cell-type specific manner between in mouse hippocampus and prefrontal cortex

Swiss Neuroscience meeting 2019 – Geneva (CH).

FMRP regulation of dendritic HCN channels between in mouse hippocampus and prefrontal cortex

Synapse meeting 2019 – Lausanne (CH).

Input specific dendritic integration by barrel cortex supragranular pyramidal cells

Swiss Neuroscience meeting 2020 – Bern (CH).

CERTIFICATES AND ABILITATIONS

RESAL module 1: Introductory course in laboratory animal science. Education and training of Persons Conducting Animal Experiments (Ordinance governing Education in Keeping and Handling Animal in Switzerland (455.109.1), Septembre 2008,5th)

SUBMITTED BUT NOT YET ACCEPTED/PUBLISHED PUBLICATIONS

Highly dynamic spines on a cortical VIP interneuron subtype. C. GEORGIOU , V.KEHAYAS, **F. BRANDALISE**, D. A. SAHLENDER, J. BLANC, G. KNOTT, A. HOLTMAAT [under review in Nature Communications].

UNPUBLISHED WORK

Loss of dendritic Na⁺ channels impairs dendritic spike generation in L5 PFC neurons in Fragile X syndrome

F. BRANDALISE*, B. KALMBACH*, JOHNSTON, D. H. BRAGER [in preparation].

***these authors contributed equally to this work.**

Focal inhibition of NMDA spike reveals the dendritic branch as the primary functional compartment in hippocampal CA3 pyramidal cell

Brandalise F, Carta S, Helmchen F, Lisman J, Holtmaat Anthony. [in preparation].

Dendritic integration of long-range inputs by barrel cortex pyramidal cells **Brandalise F***, Chereau R*, Pages S.* Holtmaat Anthony [in preparation]. ***these authors contributed equally to this work.**

Data

01/02/2021

Luogo

Arbusigny

