Pietro Baldelli

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Work Experience

2020 – to date. Full Professor
Sezione Fisiologia Umana, Dipartimento di Medicina Sperimentale (Di.Me.S.), Scuola di Scienze Mediche e Farmaceutiche, Università di Genova http://www.dimes.unige.it/rubrica/docenti/pietro-baldelli

2018 – to date. Affiliated Researcher convenzionato con IRCCS Ospedale Policlinico San Martino, Genova *https://moh-it.pure.elsevier.com/en/persons/pietro-baldelli* Responsabile Scientifico del Progetto dal Titolo: **"***Fisiopatologia della plasticità sinaptica*"

2007 – to date. Affiliated Researcher Center for Synaptic Neuroscience and Technology, Istituto Italiano di Tecnologia, Genova *https://www.iit.it/component/people/pietro-baldelli?Itemid* Responsabile Scientifico del Progetto dal Titolo*: "Exploring the anti-epileptogenic effect of low-glucose diet in a form human hereditary epilepsy due to mutation of the Synapsin II gene"*

2012 – 2020. Associate Professor Sezione Fisiologia Umana, Dipartimento di Medicina Sperimentale (Di.Me.S.), Scuola di Scienze Mediche e Farmaceutiche, Università di Genova

2005-2011. Researcher – Dipartimento di Medicina Sperimentale (Di.Me.S.), Scuola di Scienze Mediche e Farmaceutiche, Università di Genova

2003-2004. Senior PostDoc Fellowship Dipartimento di Medicina Sperimentale (Di.Me.S.), Scuola di Scienze Mediche e Farmaceutiche, Università di Genova**,** *(Prof. F. Benfenati)*

1999-2003. Researcher level III, INFM-CNR Unità di Ricerca del Dipartimento di Neuroscienze (Prof. E. Carbone), Università di Torino

1993-1994. Associate Researcher Department of Molecular Physiology and Biophysic, (Prof. E. Stefani), Baylor College of Medicine, Houston, TX, USA

Education and Training

1995-1999 PhD in Cellular Physiology and Neuroimmunophysiology, Dipartimento di Neuroscienze, Università di Torino *(Prof. Carbone)*

1992 Master's Degree in in Biology, Università di Genova

I graduated in Biological Science at the University of Genova in 1992. In 1993 I moved to the Department of Molecular Physiology and Biophysics, Baylor College of Medicine, Houston, TX with a position of Associate Researcher. I came back to Italy in 1994 at the Department of Neuroscience, University of Torino, where I obtained the PhD title in Neurophysiology in 1998 and a Researcher position in 1999. In 2003 I moved to the Department of Experimental Medicine, University of Genova where I had a position of Assistant Professor in 2005, Associate Professor in 2012 and Full Professor of Physiology in 2020. Here, I teach courses on Human Physiology, Neurophysiology and Electrophysiological Technologies. Moreover, I am Affiliated Researcher of the Center for Synaptic Neuroscience and Technology, Istituto Italiano di Tecnologia (IIT) and of the San Martino Polyclinic Hospital, Genova. My main subjects of investigation have been the molecular mechanisms underlying both physiological and pathological processes of the neurotransmission and neuronal excitability that I have investigated at different levels: from the single synaptic contact to the complexity of the neuronal network. In our laboratories we conventionally use a variety of electrophysiological and functional imaging approaches, including patch-clamp and high-density multi-electrode array recordings that we combine with conventional molecular and cellular biology techniques. In addition, we paralleled electrophysiological investigation with functional fluorescence imaging, for the study changes in Ca^{2+} concentrations or presynaptic exo-endocytosis processes and with genetic, molecular and immunochemical approaches applied to animal models of different neuropathologies. Main scientific accomplishments have been: i) the characterization of membrane excitability and synaptic transmission and plasticity in various animal models of neuro-disease, ii) the study of intrinsic and synaptic homeostasis associated to neuronal hyperactivity, iii) the investigation of neurotrophins modulation on synaptic transmission and neuronal excitability, iv) the synaptic determinants of plasticity at engineered neuronal networks, v) the study of molecular mechanisms of synaptic vesicle trafficking.

Bibliometric Parameters

Papers on peer-reviewed International Journals: 88; H-index 41; Total Citations: 4226 (Scopus)
Author of 12 reviews/chapters on books. Author of more than 200 Oral/Poster Communications at International/National Congress/Symposium/Workshop

Recent Grants (2024-2018)

-MIUR PNRR-PE Neuroscience project (2023-2025) "A multiscale integrated approach to the study of the nervous system in health and disease-MNESYS" (DIMES NEUROFISIOLOGIA Spokes: 1,2,3 - 1150 k€)

-PRIN 2022 PNRR (2023-2025): "Configuring the homeostatic deficit as the primary cause of Alzheimer's disease onset: a treatment strategy based on the restoration of calcium homeostasis" (99.000€) Role: PI UO UNIGE

-Bando della ricerca finalizzata (2022-2025) - Progetti RF Change Promoting - Title: "Identification and validation of new non-invasive biomarkers to improve diagnosis and prognosis of subjects with suspected autoimmuno-inflammatory seizures. A patient-driven preclinical precision medicine approach to test biomarker based new therapies" (160.000 Euro) Role: coPI

- PRIN 2020 Multicentre Project *(2022-2025)* Titolo del progetto Membrane targeted light driven nanoactuators for neuro-stimulation (154.786 Euro) *Role: PI*

-IRCCS San Martino 5x1000 (2021-2023) Titolo del progetto: Nuove frontiere per lo studio dei meccanismi fisiopatologici dell'epilessia. (11.000 €) *Rolo: PI.*

-Bando Fondazione Compagnia di San Paolo (2018-2022) Titolo del Progetto: Meccanismo d'azione ed applicazione della dieta ipoglicemica per la prevenzione dell'epilettogenesi in modelli di epilessia genetica umana"- *ID ROL:20612* (165.000 €). *Role: PI*

Selected Pubblications (2013-2024)

Pfeffer ME, DiFrancesco ML, Marchesi A, Galluzzi F, Moschetta M, Rossini A, Francia S, Franz CM, Fok Y, Valotteau C, Paternò GM, Redondo Morata L, Vacca F, Mattiello S, Magni A, Maragliano L, Beverina L, Mattioli G, Lanzani G, **Baldelli P***, Colombo E, Benfenati F. Nanoactuator for Neuronal Optoporation. *ACS Nano.* 2024 May 14;18(19):12427-12452. doi: 10.1021/acsnano.4c01672. Epub 2024 Apr 30.PMID: 38687909

Michetti C, Ferrante D, Parisi B, Ciano L, Prestigio C, Casagrande S, Martinoia S, Terranova F, Millo E, Valente P, Giovedi' S, Benfenati F, **Baldelli P**. Low glycemic index diet restrains epileptogenesis in a gender-specific fashion. Cell Mol Life Sci. 2023 Nov 10;80(12):356. doi: 10.1007/s00018-023-04988-1.
PMID: 37947886 Free PMC article.

Centonze E, Marte A, Albini M, Rocchi A, Cesca F, Chiacchiaretta M, Floss T, **Baldelli P,** Ferroni S, Benfenati F, **Valente P**. Neuron-restrictive silencer factor/repressor element 1-silencing transcription factor (NRSF/REST) controls spatial K+ buffering in primary cortical astrocytes. *J Neurochem.* 2023 Jan 13. doi: 10.1111/jnc.15755. Online ahead of print. PMID: 36636908

Prestigio C, Ferrante D, Marte A, Romei A, Lignani G, Onofri F, Valente P, Benfenati F, **Baldelli P**. REST/NRSF drives homeostatic plasticity of inhibitory synapses in a target-dependent fashion. *Elife*. 2021 Dec 2;10:e69058. doi: 10.7554/eLife.69058. PMID: 34855580 Free PMC article.

Ferrante D, Sterlini B, Prestigio C, Marte A, Corradi A, Onofri F, Tortarolo G, Vicidomini G, Petretto A, Muià J, Thalhammer A, Valente P, Cingolani LA, Benfenati F, **Baldelli P.** PRRT2 modulates presynaptic Ca2+ influx by interacting with P/Q-type channels. *Cell Rep.* 2021 Jun 15;35(11):109248. doi: 10.1016/j.celrep.2021.109248. PMID: 34133925

Giansante G, Marte A, Romei A, Prestigio C, Onofri F, Benfenati F, **Baldelli P*,** Valente P*. Presynaptic L-Type Ca2+ Channels Increase Glutamate Release Probability and Excitatory Strength in the Hippocampus during Chronic Neuroinflammation. *J Neurosci.* 2020 Sep 2;40(36):6825-6841. doi: 10.1523/JNEUROSCI.2981-19.2020. Epub 2020 Aug 3.

Lignani G*, **Baldelli P*,** Marra V*. Homeostatic Plasticity in Epilepsy. Front Cell Neurosci. 2020 Jun 26;14:197. doi: 10.3389/fncel.2020.00197. eCollection 2020

DiFrancesco ML, Lodola F, Colombo E, Maragliano L, Bramini M, Paternò GM, **Baldelli P**, Serra MD, Lunelli L, Marchioretto M, Grasselli G, Cimò S, Colella L, Fazzi D, Ortica F, Vurro V, Eleftheriou CG, Shmal D, Maya-Vetencourt JF, Bertarelli C, Lanzani G, Benfenati F. Neuronal firing

modulation by a membrane-targeted photoswitch. *Nat Nanotechnol*. 2020 Feb 3. doi: 10.1038/s41565-019-0632-6. [Epub ahead of print] PMID: 32015505

Forte N, Binda F, Contestabile A, Benfenati F*, **Baldelli P*** Synapsin I Synchronizes GABA Release in Distinct Interneuron Subpopulations*. Cereb Cortex*. 2019 Aug 30. pii: bhz174. doi: 10.1093/cercor/bhz174. [Epub ahead of print] PMID: 31504258

Prestigio C, Ferrante D, Valente P, Casagrande S, Albanesi E, Yanagawa Y, Benfenati F and **Baldelli P** Spike-related electrophysiological identification of cultured hippocampal excitatory and inhibitory neurons *Mol Neurobiol. 2019 Sep;56(9):6276-6292. doi: 10.1007/s12035-019-1506-5. Epub 2019 Feb 12. PMID: 30746640*

Pecoraro-Bisogni F, Lignani G, Contestabile A, Castroflorio E, Pozzi D, Rocchi A, Prestigio C, Orlando M, Valente P, Massacesi M, Benfenati F and **Baldelli P.** (2017) REST-Dependent Presynaptic Homeostasis Induced by Chronic Neuronal Hyperactivity. *Mol Neurobiol*. 2017 Aug 7. doi: 10.1007/s12035-017-0698-9. PMID: 28786015

Forte N, Medrihan L, Cappetti B, **Baldelli P**, Benfenati F. (2016) 2-Deoxy-d-glucose enhances tonic inhibition through the neurosteroid-mediated activation of extrasynaptic GABAA receptors. *Epilepsia*. 2016 Dec;57(12):1987-2000. doi: 10.1111/epi.13578.

Valente P, Lignani G, Medrihan L, Bosco F, Contestabile A, Lippiello P, Ferrea E, Schachner M, Benfenati F, Giovedì S, **Baldelli P**. (2016) Cell adhesion molecule L1 contributes to neuronal excitability regulating the function of voltage-gated Na+ channels. *J Cell Sci.* 2016 May 1;129(9):1878-91. doi: 10.1242/jcs.182089. Epub 2016 Mar 16.

P.Valente, M.Orlando, A. Raimondi, F. Benfenati and **P. Baldelli** (2016) Fine tuning of synaptic plasticity and filtering by GABA released from hippocampal autaptic granule cells. Cereb Cortex. 2016 Mar;26(3):1149-67. doi: 10.1093/cercor/bhu301

P. Baldelli and J. Meldolesi (2015) The Transcription Repressor REST in Adult Neurons: Physiology, Pathology, and Diseases *eNeuro* Jul 2015, 2 (4) DOI: 10.1523/ENEURO.0010-15

Medrihan L, Ferrea E, Greco B, **Baldelli P**, Benfenati F. (2014) Asynchronous GABA Release Is a Key Determinant of Tonic Inhibition and Controls Neuronal Excitability: A Study in the Synapsin II-/- Mouse. Cereb Cortex. 2015 Oct;25(10):3356-68. doi: 10.1093/cercor/bhu141. Epub 2014 Jun 24. PMID: 24962993

Pozzi D, Lignani G, Ferrea E, Contestabile A, Paonessa F, D'Alessandro R, Lippiello P, Boido D, Fassio A, Meldolesi J, Valtorta F, Benfenati F, **Baldelli P.** REST/NRSF-mediated intrinsic homeostasis protects neuronal networks from hyperexcitability. *EMBO J.* 2013 Nov 13;32(22):2994-3007. doi: 10.1038/emboj.2013.231

Farisello; D Boido; T Nieus; L Medrihan; F Cesca; F Valtorta; **P Baldelli***; F Benfenati* (2013) Synaptic and Extrasynaptic Origin of the Excitation/Inhibition Imbalance in the Hippocampus of Synapsin I/II/III Knockout Mice *Cereb Cortex.* 2013 Mar;23(3):581-93. doi: 10.1093/cercor/bhs041.