Curriculum Vitae

Dr. Laura Bellingacci

Personal Information

Education

10/2020-02/2024	**PhD in Clinical and Molecular Medicine - curriculum of Neuroscience - XXXVI Cycle** **Department of Medicine and Surgery, University of Perugia** Project: **Neuroinflammation and synaptic function interplay: implications for neurological diseases** The research activity focused on studying synaptic transmission and plasticity using electrophysiological techniques in experimental models of inflammatory and degenerative diseases of the central nervous system. In particular, the major goal of our research team and my PhD program was to investigate how the immune system modulates behavior, learning, and memory processes. **Thesis defense committee members:** Professor Lucilla Parnetti, University of Perugia; Professor Charlotte Teunissen, Amsterdam University Medical Center; Professor Alessandro Padovani, University of Brescia.
07/2020	**Professional qualification as Biologist; Section A, University of Perugia, Italy**
2017-2019	**Master's degree cum Laude in MEDICAL VETERINARY or FORENSIC BIOTECHNOLOGICAL SCIENCES (LM-9), international course, University of Perugia** Thesis title: The Neuroprotective Effect of Perampanel on *in vitro* brain ischemia Age at achievement: 24 years
2014-2017	**Bachelor's Degree cum Laude in BIOLOGY (L-13), University of Perugia** Age at achievement: 22 years

Research Experience

12/2024-11/2026	**Post-Doctoral Researcher funded by the Italian Multiple Sclerosis Society Foundation (FISM) on the project entitled "Inflammation and central dopaminergic transmission in the EAE brain: implications for psychiatric and cognitive symptoms in MS."**
12/2023-11/2024	**Post-Doctoral Researcher on the PRIN project entitled "Mechanisms underlying therapeutic approaches in an alpha synuclein-based model of Parkinson's disease: from pharmacological to non-pharmacological strategies" Prot.2022CAKAHL**
03/2023-present	**Training course for functions A and D of Lgs D. No. 26/2014 on the protection of animals used for scientific purposes**
04/2022-10/2022	**Pre-Doctoral Research Fellowship funded by the Fresco Parkinson's Institute, conducted at NYU Langone Health Institute, NYC**

The research period was conducted in the laboratories of Professor Nicolas Tritsch at the Neuroscience Institute and Fresco Institute for Parkinson's and Movement Disorders at New York University Langone Health (NYULH). The research project focused on the effects of peripheral inflammation at the level of the basal ganglia circuit, with the ultimate goal of deciphering the role of inflammatory mediators in controlling mood and behavior during the course of neurological disease.

10/2019-10/2020 **Research contract with the Department of Experimental Medicine, University of Perugia funded by Telethon Foundation**

Project: **Neuronal dysfunctions underlying Phelan McDermid syndrome and their rescue by genetic and pharmacological modulation of mGlu5 signaling**

Research interests

I started my research experience during my academic training in Medical Biotechnology at the Experimental Neurology Labs of the University of Perugia, focusing on the investigation of neuronal transmission and plasticity in physiological conditions and during the main inflammatory and degenerative diseases of the central nervous system (CNS), such as multiple sclerosis, Parkinson's and Alzheimer's diseases. In 2019 I defended my degree thesis on neuroprotective strategies against brain ischemia and then I started a one-year research fellowship in the same Lab. During this period, I gained skills in experimental electrophysiology in rodent hippocampal and striatal brain slices. I also learned how to induce and set up experimental models of neurological disorders such as the experimental autoimmune encephalomyelitis (EAE) model of multiple sclerosis, as well as the *in-vitro* models of alpha-synucleinopathy and cerebral amyloidosis and to perform behavioral analyses in mice to investigate procedural and spatial memory. **My main research interest deals with the study of the synaptic mechanisms underlying the formation and weakening of brain memory traces, with the aim to understand brain network dynamics during neurological and neuropsychiatric disorders.** I started a Ph.D. program at the University of Perugia (Project: Neuroinflammation and synaptic function interplay: implications for neurological diseases) under the mentorship of Professor Massimiliano Di Filippo, with a project focused on the study of the interplay between the immune and the nervous system in the modulation of synaptic transmission and plasticity of the CNS. The main aim of my project is to investigate the role of immune molecules, as brain network modulators, in both the hippocampal and basal ganglia circuits. In particular, my current research is focused on the study of the pro-inflammatory cytokines interleukin-17A and interferon- γ in the modulation of brain plasticity in both physiological conditions and in experimental models of neuro-inflammatory diseases. In 2022, I started my pre-doctoral research fellowship in the labs of Professor Nicolas Tritsch, Neuroscience Institute and Fresco Institute for Parkinson's and Movement Disorders at New York University Langone Health (NYULH). The research project focused on the effects of peripheral inflammation at the level of the basal ganglia circuit, with the goal of deciphering the role of inflammatory mediators in controlling mood and behavior during the course of neurological disease. In the coming months, thanks to the two-year grant from the Italian Multiple Sclerosis Society Foundation (FISM) I will deepen the intertwined relation between immunity and synaptic function in the pathogenesis of multiple sclerosis, and its implications for its psychiatric and cognitive symptoms.

Conferences attended

28-30 May 2024	**Annual Scientific Congress of the Italian Multiple Sclerosis Society Foundation (FISM)**
17 May 2024	**"Approccio terapeutico alle epilessie rare" - Perugia**
20 Aug 2023	**4th Global School of Neuroimmunology, Quebec City, Canada.**
27-28 Oct 2022	**Up-date in Epilettologia Clinica e Sperimentale, Perugia-**
20-22 May 2020	**Virtual Dopamine Conference 2020**
26-29 Sept 2019	**18th National Congress of the Italian Society for Neuroscience (SINS), Perugia**

Presentations

19-21 Sept 2024 — **The 2024 Fresco International Workshop on Synaptic Plasticity and Advances in Parkinson's Disease**
Oral presentation: ***Oligomeric alpha-synuclein causes early striatal synaptic dysfunction associated with non-motor symptoms***

22-24 May 2024 — **17th Annual Meeting of Young Researchers in Physiology (YRP2024)**
Oral presentation: ***Oligomeric alpha-synuclein causes early striatal synaptic dysfunction associated with non-motor symptoms***

14 Sept 2023 — **SINS (Italian Society for Neuroscience) National Meeting of Ph.D. Students in Neuroscience**
Poster presentation: ***Neuroinflammation and basal ganglia circuit dynamics: a study on the effects of acute peripheral inflammation on dopaminergic neurons***

Bellingacci L, Mancini A, Canonichesi J, Costa C, Parnetti L,Tritsch NX and Di Filippo M

9-13 Sept 2023 — **11th IBRO World Congress of Neuroscience, Granada, Spain.**
Poster presentation: ***Neuroinflammation and basal ganglia circuit dynamics: a study on the effects of acute peripheral inflammation on dopaminergic neurons***

Bellingacci L, Mancini A, Canonichesi J, Costa C, Parnetti L,Tritsch NX and Di Filippo M

8 Sept 2023 — **Invited speaker for Fresco Foundation and Parkinson's Foundation Site Visit, Perugia, Italy.**
Oral presentation: ***Animal model-based research*****, Bellingacci L, Mancini A, Di Filippo M**

21-24 Aug 2023 — **16th ISNI (International Society of Neuroimmunology) Congress, Quebec City, Canada.**
Poster Presentation: ***Neuroinflammation and basal ganglia circuit dynamics: a study on the effects of acute peripheral inflammation on dopaminergic neurons***

Bellingacci L, Mancini A, Canonichesi J, Costa C, Parnetti L,Tritsch NX and Di Filippo M

28 Jan 2023 — **"Discussione in Epilettologia Sperimentale 2", Sapienza Università di Roma**
Oral presentation: ***Electrophysiological characterization of a mouse model of Lafora disease***

Bellingacci L, Russo A, Geusa M, Canonichesi J, Tozzi A, Costa C, and Sciaccaluga M.

7-10 Jun 2022 — **The 2022 Fresco International Workshop on Synaptic Plasticity and Advances in Parkinson's Disease**
Poster and Oral presentation: ***Neuro-immune modulation of the basal ganglia network: IL-17 and striatal neuroplasticity***

***Bellingacci L**, Mancini A*, Canonichesi J, Sciaccaluga M, Megaro A, Zianni E, De Carluccio M, Pariano M, Tozzi A, Costa C, Zelante T, Romani L, Viscomi MT, Gardoni F, Calabresi P, Parnetti L, and Di Filippo M.*

20-22 Oct 2021 — **BraYn conference 4th Brainstorming Research Assembly for Young Neuroscientists**
Poster presentation: ***Modulation of AMPA glutamate receptors as a strategy to counteract hippocampal hyperexcitability and cognitive deficits in mouse models of cerebral amyloidosis***

Laura Bellingacci[1], Antonio Leo[2], Andrea Mancini[1], Alfredo Megaro[1], Martina Tallarico[2], Carmen De Caro[2], Alessandro Tozzi[3], Massimiliano Di Filippo[1], Miriam Sciaccaluga[1], Emilio Russo[2] and Cinzia Costa[1]

16-17 Sep 2021 — **The Silent Disease Activity in MS: molecular and imaging biomarkers**
Oral presentation: ***Interleukin-17A affects synaptic plasticity and cognition in experimental multiple sclerosis***

11-15 July 2020 — **FENS 2020 Virtual Forum**
Poster presentation: ***Interleukin-17A and hippocampal synaptic plasticity: implications for multiple sclerosis***

Bellingacci L[1], Mancini A[2], Mazzocchetti P[2], Megaro A[2], Sciaccaluga M[2], Durante V[2], Tantucci M[2], Chiasserini D[1], Gaetani L[2], Tozzi A[1], Costa C[2], Zelante T[3], La Barbera L[4], Parnetti L[2], Romani L[3], Viscomi MT[5], Calabresi P[6] and Di Filippo M[2]

14-16 Nov 2019 — **BraYn Conference 2nd Brainstorming Research Assembly for Young Neuroscientists**

Poster presentation: ***Low doses of Perampanel protect striatal and hippocampal neurons against in vitro ischemia by reversing the ischemia-induced alteration of AMPA receptor subunit composition***

L. Bellingacci[1], *P. Mazzocchetti* [2], *A. Megaro*[2], *A. Mancini* [2], *M. Sciaccaluga* [2], *N. Carrano*[3], *F. Gardoni* [3], *A. Tozzi* [1], *P. Calabresi* [2], *C. Costa* [2]

Moderator activities

23 May 2024 **Chair at the oral *session III – Neurophysiology* of the 17th Annual Meeting of Young Researchers in Physiology (YRP2024)**

Scientific societies

2024- present **Member of the Italian Society of Physiology (SIF)**

2023- present **Member of the Italian Neuroimmunology Association (AINI)**

2021- present **Member of the BraYn association**

2019- present **Member of the Italian Society for Neuroscience (SINS)**

Grants - Awards

May 2024 **Travel grant from the Italian Society of Physiology (SIF) for the Annual Meeting of Young Researchers in Physiology 2024 (YRP2024)**

Jan 2024 **Winner of a two-year grant from the Italian Multiple Sclerosis Society Foundation (FISM) for the project entitled "Inflammation and central dopaminergic transmission in EAE brain: implications for psychiatric and cognitive symptoms in MS"**

July 2023 **Travel grant from the Italian Neuroimmunology Association (AINI) for the International Congress of the ISNI (International Society of Neuroimmunology), August 20-24, Quebec City.**

Jan 2023 **Winner of the Young Researcher Award for best oral communication at "Discussione in Epilettologia Sperimentale 2", Sapienza Università di Roma. Oral presentation: "Electrophysiological characterization of a mouse model of Lafora disease"**

Jan 2022 **Winner of a Pre-Doctoral Research Fellowship from the Fresco Parkinson's Foundation, conducted at NYU Langone Health Institute, Fresco Parkinson's Institute, NYC**

July 2021 **Travel Grant for the national congress: "The Silent Disease Activity in MS: molecular and imaging biomarkers" Riva del Garda, September 16 and 17, 2021**

May 2020 **Grant award from SINS (Italian Society for Neuroscience) for FENS (Federation of European Neuroscience Societies) Virtual Forum 2020 participation**

Didactic activities

9 May 2024 **Seminar lecture titled "Long-term memory: role of the immune system in physiology and pathology" (2h); Molecular diagnostic in Neuropathology - physiology module - BIOS-06/A - ex SSD BIO/09, Medical, Veterinary or Forensic Biotechnological Sciences degree program. Teaching Professor: Alessandro Tozzi / Miriam Sciaccaluga**

27 Mar 2024 **Seminar lecture titled "Long-term memory: role of the immune system in physiology and pathology" (2h); Human Physiology 1 - BIOS-06/A - ex SSD BIO/09, Medicine and Surgery degree program.**
Teaching Professor: Alessandro Tozzi

2023- present **Subject Expert and Teaching Assistant (Cultore della Materia) of the physiology module (BIOS-06/A - ex SSD BIO/09) in Molecular Diagnostic in Neuropathology - Master's Degree in Medical Veterinary or Forensic Biotechnological Sciences – University of Perugia.**
Teaching Professor: Alessandro Tozzi

2019- present **Organization of tutoring activities and practical laboratory lessons for students of the course of "Molecular diagnostic in neuropathology" - physiology module - BIOS-06/A - ex SSD BIO/09, Medical, Veterinary or Forensic Biotechnological Sciences, University of Perugia. (20 hrs per academic year)**
Teaching Professors: Cinzia Costa / Alessandro Tozzi

02/2019-07/2019 **Tutoring activities addressed to the students of the Master's degree course in Medical, Veterinary, or Forensic biotechnological sciences - Interdepartmental School of Medicine and Surgery, University of Perugia (48 hrs)**

Projects participation

2024-2026 **FISM Bando 2023 – 2023/BR/005 Italian Multiple Sclerosis Foundation**
Project entitled **"Inflammation and central dopaminergic transmission in EAE brain: implications for psychiatric and cognitive symptoms in MS".**

2023-2025 **PRIN Bando 2022 – Prot.2022CAKAHL**
Italian Ministry of University and Research
Project entitled **"Mechanisms underlying therapeutic approaches in an alpha synuclein-based model of Parkinson's disease: from pharmacological to non-pharmacological strategies"**

2021-2023 **Ricerca di Base – Progetti di Ricerca di Base Anno 2020**
Department of Medicine and Surgery, University of Perugia
Project entitled **"Neuroimmunologia della disfunzione sinaptica nella malattia di Parkinson: studio dell'asse dell'interleuchina-17 come nuovo orizzonte terapeutico"**

Editorial activities

Since 2024 **Review Editor for the journal "Frontiers in Cellular Neuroscience"**

Referee Activities

Since 2024 **She is serving as ad hoc Referee for international journals:**
"Cells" MDPI journal
"International Journal of Molecular Science" MDPI journal
"Clinical and Translational Neuroscience" MDPI journal

Technical skills

- Animal manipulation techniques, including stereotactic surgery, aimed at modelling neurodegenerative and neuroinflammatory diseases in rodents (mouse and rat):
    - Experimental autoimmune encephalomyelitis (EAE) model
    - Models of cerebral amyloidosis
    - Models of alpha-synucleinopathy
- Planning, execution, and analysis of behavioral tests aimed at studying cognitive and motor learning, such as:
    - Open field for the assessment of locomotor activity
    - Grid-test, Pole-test, and Rota-rod for the evaluation of learning and motor coordination
    - Hole-board test and Novel Object recognition test, to assess cognitive learning
    - Sociability test, to assess social deficits

- Electrophysiological recordings on rodent brain slices by extracellular recording of field potentials and patch-clamp recording in cell-attached and whole-cell configuration for the analysis of spontaneous and evoked synaptic transmission and for the study of short- and long-term synaptic plasticity phenomena such as long-term potentiation and depression (LTP and LTD).
- Performance of immunohistochemistry techniques on rodent brain slices
- Manual skill in isolating various brain areas, such as hippocampus, nucleus striatum, and cortex; sampling the spinal cord and internal organs.
- Excellent experience in electrophysiological data analysis using the following programs: Clampfit for data extrapolation and GraphPad for graphing and statistical analysis. Good expertise in behavioral analysis performed offline with the ODLog program. Good knowledge of the ImageJ program for extrapolation and analysis of immunohistochemistry images.
- Good knowledge of the Corel Draw program for data presentation and scientific figure-making

Bibliometric indicators

217 citations with an **H-index of 8** (Scopus - Dec 2024)

Publications

1. **Bellingacci L**, Sciaccaluga M, Megaro A, Cardinale A, Canonichesi J, De Carluccio M, Mastrantonio R, Costa C, Di Filippo M, Usiello A, Viscomi MT, Calabresi P, Tozzi A. Oligomeric alpha-synuclein causes early synaptic dysfunction of the corticostriatal pathway associated with non-motor symptoms. *Submitted.*

2. Zafra-Puerta, Burgos, Iglesias-Cabeza, Sciaccaluga, González-Fernández, **Bellingacci**, Canonichesi, Sánchez-Martín, Costa, Sánchez, Serratosa. Gene therapy for Lafora disease in the Epm2a-/- mouse model. **Molecular Therapy. I.F. 12.4.**

3. **Bellingacci, L.**; Canonichesi, J.; Sciaccaluga, M.; Megaro, A.; Mazzocchetti, P.; Di Mauro, M.; Costa, C.; Di Filippo, M.; Pettorossi, V.E.; Tozzi, A. Locally Synthetized 17-β-Estradiol Reverses Amyloid-β-42-Induced Hippocampal Long-Term Potentiation Deficits. **Int. J. Mol. Sci. 2024**, 25, 1377. **I.F. 5.6**

4. Errico, F., Gilio, L., Mancini, A., Nuzzo, T., Bassi, M. S., **Bellingacci, L**., Buttari, F., Dolcetti, E., Bruno, A., Galifi, G., Furlan, R., Finardi, A., Di Maio, A., Di Filippo, M., Centonze, D., & Usiello, A. (2023). Cerebrospinal fluid, brain, and spinal cord levels of L-aspartate signal excitatory neurotransmission abnormalities in multiple sclerosis patients and experimental autoimmune encephalomyelitis mouse model. **Journal of Neurochemistry**, 00, 1– 13. **I.F. 5.546**

5. **Bellingacci L**, Canonichesi J, Mancini A, Parnetti L and Di Filippo M. Cytokines to remember: a matter of balance. **Neural Regen. Res. 18(12):p 2569-2572, December 2023. I.F. 6.058.**

6. Menculini G, Mancini A, Gaetani L, **Bellingacci L**, Tortorella A, Parnetti L, Di Filippo M. Psychiatric symptoms in multiple sclerosis: a biological perspective on synaptic and network dysfunction. ***J Neurol Neurosurg Psychiatry***. ***2023 Jan 18:jnnp-2022-329806. I.F. 10.154.***

7. **Bellingacci L,** Tallarico M, Mancini A, Megaro A, De Caro C, Citraro R, De Sarro G, Tozzi A, Di Filippo M, Sciaccaluga M, Russo E, Leo A, Costa C. Non-competitive AMPA glutamate receptors antagonism by perampanel as a strategy to counteract hippocampal hyper-excitability and cognitive deficits in cerebral amyloidosis. ***Neuropharmacology. 2023 Mar 1;225:109373. I.F. 5.25.***

8. Di Filippo M, Mancini A*****, **Bellingacci L***, Gaetani L, Mazzocchetti P, Zelante T, La Barbera L, De Luca A, Tantucci M, Tozzi A, Durante V, Sciaccaluga M, Megaro A, Chiasserini D, Salvadori N, Lisetti V, Portaccio E, Costa C, Sarchielli P, Amato MP, Parnetti L, Viscomi MT, Romani L, Calabresi P. Interleukin-17 affects synaptic plasticity and cognition in an experimental model of multiple sclerosis. ***Cell Rep. 2021 Dec 7;37(10):110094. I.F. 9.995.***

9. **Bellingacci, L.**; Mancini, A.; Gaetani, L.; Tozzi, A.; Parnetti, L.; Di Filippo, M. Synaptic Dysfunction in Multiple Sclerosis: A Red Thread from Inflammation to Network Disconnection. ***Int. J. Mol. Sci. 2021, 22, 9753. I.F. 6.208.***

10. Tozzi A, Sciaccaluga M, Loffredo V, Megaro A, Ledonne A, Cardinale A, Federici M, **Bellingacci L**, Paciotti S, Ferrari E, La Rocca A, Martini A, Mercuri NB, Gardoni F, Picconi B, Ghiglieri V, De Leonibus E, Calabresi P. Dopamine-dependent

early synaptic and motor dysfunctions induced by α-synuclein in the nigrostriatal circuit. ***Brain***. ***2021 Jul 23:awab242. I.F. 15.255.***

11. Tozzi A, **Bellingacci L**, Pettorossi VE. Rapid Estrogenic and Androgenic Neurosteroids Effects in the Induction of Long-Term Synaptic Changes: Implication for Early Memory Formation. ***Front Neurosci***. ***2020 Oct 27;14:572511. I.F. 4.501.***

12. Mancini A, Mazzocchetti P, Sciaccaluga M, Megaro A, **Bellingacci L**, Beccano-Kelly DA, Di Filippo M, Tozzi A, Calabresi P. From Synaptic Dysfunction to Neuroprotective Strategies in Genetic Parkinson's Disease: Lessons From LRRK2. ***Front Cell Neurosci***. ***2020 Jul 28;14:158. I.F. 4.860.***

13. Mazzocchetti P, Mancini A, Sciaccaluga M, Megaro A, **Bellingacci L**, Di Filippo M, Cesarini EN, Romoli M, Carrano N, Gardoni F, Tozzi A, Calabresi P, Costa C. Low doses of Perampanel protect striatal and hippocampal neurons against in vitro ischemia by reversing the ischemia-induced alteration of AMPA receptor subunit composition. ***Neurobiol. Dis. 2020 Jul;140:104848. I.F. 7.046.***

Chapters of books

Mancini A., **Bellingacci L.**, Canonichesi J and Di Filippo M. Immunity and Cognition. Translational Immunology, Neuroinflammation, Volume 7,2023, Pages 129-149.

I hereby authorize the treatment of my personal data in accordance with Legislative Decree No. 196 of June 30, 2003 and the GDPR (EU Regulation 2016/679).

09/12/2024 Signature