MARCO MAINARDI – CURRICULUM VITÆ ET STUDIORUM

PERSONAL INFORMATION

E-mail: marco.mainardi@unipd.it
Date of birth: [redacted]

Bibliometric indicators: Scopus ID: 26424686300; ORCID: orcid.org/0000-0003-2001-1287
H-index: Scopus 21, Scholar 23. Citations: Scopus 1150, Scholar 1516.

POSITIONS

Jun 2023 – present, associate professor of Physiology, Department of Biomedical Sciences, University of Padua

Jan - May 2023, Neuroscience Institute, National Research Council (IN-CNR), Pisa: **senior researcher** (primo ricercatore II livello).

Jan 2020 – May 2023, University of Pisa: adjunct professor of Neurobiology, English-taught MSc program in Neuroscience, Neurobiology III course.

Nov 2019 – Dec 2022, Neuroscience Institute, National Research Council (IN-CNR), Pisa: **tenured researcher** (ricercatore III livello).

Sep 2017 – Nov 2019, Scuola Normale Superiore: assistant professor (ricercatore a tempo determinato tipologia "a" legge 240/2010) of Physiology at the Laboratory of Biology.

May – Jul 2017, Catholic University of the Sacred Heart, Rome: research fellowship at the Institute of Human Physiology.

May 2014 – Apr 2017, Catholic University of the Sacred Heart, Rome: assistant professor (ricercatore a tempo determinato tipologia "a" legge 240/2010) of Physiology at the Institute of Human Physiology.

Dec 2013 – Apr 2014, Accademia Nazionale dei Lincei: post-doctoral fellowship "Giuseppe Levi", spent at the Institute of Neuroscience, National Research Council (CNR), Pisa.

Dec 2010 – Nov 2013, Institute of Neuroscience, National Research Council (CNR), Pisa: post-doctoral fellowship under the program "Train the Brain: clinical and experimental study of the efficacy of cognitive training and physical exercise in dementia" (grant awarded by Fondazione Cassa di Risparmio di Pisa to Prof. Lamberto Maffei).

Feb 2010 – Jul 2010: Scuola Normale Superiore: research fellowship (law 449/1997) at the Laboratory of Neurobiology.

Jan 2007 – Dec 2009: Scuola Normale Superiore di Pisa: PhD fellowship in Neurobiology

EDUCATION

Jan 2007 – Dec 2009, Scuola Normale Superiore di Pisa: PhD in Neurobiology obtained on Sep 23, 2010 with the thesis "Environmental enrichment and visual system: thalamocortical and crossmodal plasticity", supervisors Prof. Lamberto Maffei and Prof. Matteo Caleo; 70/70 *cum laude*.

Oct 2001 – Sep 2006, Scuola Normale Superiore di Pisa: Honors course (Corso Ordinario) in Biology, Academic Class of Sciences. Honors degree (*Diploma di Licenza*) in Biology obtained on Oct 31, 2007, 70/70 *cum laude*.

Oct 2004 – Jul 2006, University of Pisa: MSc in Biomolecular Sciences and Technologies (class 6/S), obtained on Jul 18, 2006, with the thesis "Role of chondroitin-sulphate proteoglycans in rat visual cortex plasticity: anatomical effects", supervisors Prof.s Lamberto Maffei and Tommaso Pizzorusso, 110/110 *cum laude*.

Oct 2001 – Oct 2004, University of Pisa: BSc in Molecular Biological Sciences (class 12), obtained on Oct 14, 2004 with the thesis "Generation of GST-XOTX2 and GST-XOTX5b recombinant proteins by molecular cloning, and their expression in E. coli", supervisor Prof. Robert Vignali, 110/110 *cum laude*.

EXPERIENCES IN FOREIGN LABS

Jun - Aug 2016, Columbia University (New York, NY, USA): Visiting assistant professor at the laboratory of Prof. Ottavio Arancio, Taub Institute for Research on Alzheimer's Disease and the Aging Brain.

March 2013, Medical Research Council (Mill Hill, Londra, UK): Visiting post-doc at the "Intercellular signalling logic in brain and metabolic orchestration" laboratory, director Prof. Denis Burdakov.

Jun – Jul 2009, Cold Spring Harbor Laboratory (New York, NY, USA): Laboratory Summer school "Advanced Techniques in Molecular Neuroscience".

RESEARCH and SCIENTIFIC INTERESTS

Alzheimer's disease
Synaptic plasticity
Learning and Memory
Development of genetically encoded tools for the analysis and manipulation of synapses
Strategies to promote synaptic plasticity in physiological and pathological contexts

Dr Marco Mainardi graduated, cum laude, in Biomolecular Sciences and Techniques in July 2006, with an experimental thesis about the role of the extracellular matrix in modulating visual system plasticity, under the supervision of Prof.s Lamberto Maffei and Tommaso Pizzorusso. He also obtained, cum laude, an Honors Degree (Diploma di Licenza) in Biology after completing the Corso Ordinario in Biology (2001-2006) at the Class of Sciences of Scuola Normale Superiore, Pisa. Dr Mainardi continued his education with a PhD course in Neurobiology at Scuola Normale Superiore (2006-2009) under the supervision of Prof.s Lamberto Maffei, Matteo Caleo and Tommaso Pizzorusso, followed by a brief research fellowship (February-July 2010) at the same Institution. The research activity focused on the relationship between motor, cognitive and social stimulation (by means of the environmental enrichment experimental paradigm) and neural plasticity. A first experimental line elucidated how environmental enrichment can reinstate juvenile-like plasticity in the adult rat visual cortex. This conclusion was obtained by means of in vivo Long-Term Potentiation electrophysiological experiments. In addition, using Western blotting, Dr Mainardi demonstrated that an increased excitation/inhibition ratio is involved in the stimulation of cortical plasticity by environmental enrichment. This study was followed by experiments aimed to understand the effects of environmental enrichment on crossmodal plasticity among cortical areas with different functions, using EEG/Local Field Potential recordings in freely moving mice and neuroanatomical tracing. In a second project, he employed neuroanatomy and confocal imaging techniques to demonstrate how parvalbumin interneurons are key mediators of experience-induced cortical plasticity processes (using the monocular deprivation model).

A third project discovered that environmental stimuli set the sensitivity of the arcuate nucleus of the hypothalamus to metabolic hormones. Modulation in the excitation/inhibition ratio was found to be a mediator of synaptic plasticity also in this anatomical district, which is – apparently – very different from the visual cortex, thus demonstrating the existence of common principles in the regulation of neural response to external stimuli.

Dr Mainardi obtained his PhD in Neurobiology, cum laude, in 2010. Then, he spent three years (2010-2013) as a post-doc at the CNR Institute of Neuroscience (Pisa), followed by a fellowship awarded by Accademia dei Lincei at the same institution (2013-2014). A first line of research was focused on investigating whether environmental enrichment can stimulate neural plasticity during aging. The experiments were performed using in vivo electrophysiology (EEG/Local Field Potential recordings) and biochemistry (Western blotting) and demonstrated that sensory stimulation of the aged brain can (i) improve crossmodal cortical interactions, (ii) decrease soluble amyloid-β oligomers, and (iii) modulate the excitation/inhibition ratio. These results were published on Frontiers in Aging Neuroscience. Those experiments were part of the "Train the Brain" program, coordinated by Prof. Lamberto Maffei with the goal of setting up a training protocol to counteract age-related cognitive decline in humans.

During this period, Dr Mainardi also strived to exploit the translational potential of cerebral plasticity modulation, by contributing to the design and project of a robotic rehabilitation device for animal models of stroke, in collaboration with Prof. Silvestro Micera (Scuola Superiore Sant'Anna, Pisa; EPFL, Lausanne) and under the supervision of Prof. Matteo Caleo. This device was patented.
The findings on the modulation of the excitation/inhibition ratio had their natural development in the set up and characterization – using electrophysiology, biochemistry and neuroanatomy – of a focal cortical epilepsy model, published on Epilepsia. Within this line is also contained the analysis of a "double cortex" transgenic model, in collaboration with Prof. Magdalena Götz (Helmholtz Center, Munich).
A further experimental line concentrated on the search for "enviromimetics", capable of pharmacologically reproducing the effects of environmental enrichment. Experiments performed using behavioral, biochemical and neuroanatomical analyses demonstrated that fluoxetine modulates hypothalamic plasticity in both physiological and diet-induced obesity conditions.
In May 2014, Dr Mainardi was appointed Assistant Professor (Ricercatore a tempo determinato tipo "a") at the Institute of Human Physiology of Catholic University of the Sacred Heart, Rome, directed by Prof. Claudio Grassi. The main line of research focused on the impact of diet and metabolic hormones on synaptic plasticity. To pursue his research goals, Dr Mainardi acquired expertise in patch-clamp recordings on cell cultures and brain slices, and in protein immunoprecipitation. A first result was the demonstration that leptin has neurotrophin-like effects on the hippocampus, manifesting as a potentiation of synaptic transmission. This effect is impaired in high-fat diet. In addition, high-fat diet impinges on hippocampal plasticity by increasing the palmitoylation of glutamate receptors.
Dr Mainardi also set up a system for the recording of EEG/Local Field Potentials in freely moving mice, thus introducing a new technique in the lab.
Further experiments were performed to clarify the mechanisms of impaired synaptic transmission due to tau protein. This project required a visit to Prof. Ottavio Arancio's lab (Columbia University, New York). Patch-clamp recordings elucidated that inhibition of synaptic transmission by tau depends on his internalization by astrocytes which, in turn, respond with an altered gliotransmitter release. These results were published on Glia.
Experimental research was performed along with teaching in the English-taught course in Medicine and Surgery, consisting of both practicals and lectures on Human Physiology topics.
In September 2017, Dr Mainardi moved to Scuola Normale Superiore (Pisa), as an Assistant Professor (ricercatore a tempo determinato tipo "a") at the Laboratory of Biology, directed by Prof. Antonino Cattaneo. The research activity on synaptic plasticity continued with the goal of designing new tools for the study of potentiation at a single-synapse resolution. This project aims to analyze memory engrams at the electrophysiological, anatomical, and proteomic levels, using gene constructs for the expression of fluorescent reporters, optogenetic probes, or baits for immunoprecipitation and mass spectrometry, in a potentiated synapse-specific manner. This approach will allow a shift in the study of the physical substrates of memory from the whole cell to the single synapse. This toolbox is currently being tested with patch-clamp optogenetics, imaging and proteomics (in collaboration with Dr. Alessandro Ori, Leibniz Institute, Jena) experiments. Intermediate results of this project were presented with two oral communications at the "Neuroscience 2018" international meeting (San Diego) and, in 2019, at the "ProMEMO – Proteins and Circuits in Memory" meeting (Copenhagen) and at the annual meeting of the Italian Society for Physiology (Bologna).
A parallel project deals with the role of Nerve Growth Factor in learning pain-related episodic memories, using behavioral (cognitive performance, fear conditioning) and neuroanatomical analyses of point mutation involved in altered processing of nociceptive information
Teaching activity is composed of lectures in Neurobiology, Neurophysiology and Experimental Design, for both Honors degree in Biology and PhD in Neuroscience students, in addition to practicals in Biology.
In November 2019, Dr Mainardi won a national selection for positions of "ricercatore" (investigator) at the Institute of Neuroscience of the National Research Council (CNR), Pisa. He was promoted to "primo ricercatore" (senior investigator) in January, 2023. In parallel, Dr Mainardi continued teaching Neurobiology at both University of Pisa and Scuola Normale Superiore.

In June 2023, Dr Mainardi was appointed associate professor of Physiology at the Department of Biomedical Sciences of the University of Padua, where he will continue to perform research aimed at (i) identifying the topography and molecular features of synapses undergoing plasticity triggered by learning and memory through the combination of *in vivo* delivery of gene constructs, confocal imaging, optogenetics and proteomics, in physiological conditions and in animal models of Alzheimer's disease; (ii) understanding the role of environment and lifestyle in promoting synaptic plasticity in brain aging and age-related neurodegeneration.

TECHNICAL SKILLS

Behavioral tests on mice and rats
Stereotaxic surgery
In vivo delivery of gene constructs via Adeno-Associated Viral vectors
In vivo and *ex vivo* electrophysiology (EEG, evoked potentials, field potentials, patch-clamp)
Optogenetics-assisted electrophysiology
Western blotting and immunoprecipitation, ELISA immunoassays
Neuroanatomy and confocal microscopy

PUBLICATIONS

Articles on peer-reviewed journals

43. Sale A, Noale M, Cintoli S, Tognoni G, Braschi C, Berardi N, Maggi S, Maffei L; **Train the Brain Consortium*. "**Long-term beneficial impact of the randomised trial 'Train the Brain', a motor/cognitive intervention in mild cognitive impairment people: effects at the 14-month follow-up." Age Ageing 2023 May 1;52(5):afad067. doi: 10.1093/ageing/afad067. IF(2022) 6.700. *Marco Mainardi is a member of the "Train the Brain" consortium.

42. De Vincentiis S, Baggiani M, Merighi F, Cappello V, Lopane J, Di Caprio M, Costa M, Mainardi M, Onorati M, Raffa V. "Low Forces Push the Maturation of Neural Precursors into Neurons." Small 2023 Apr 14:e2205871. doi: 10.1002/smll.202205871. IF(2022) 13.300.

41. Pacifico P, Testa G, Amodeo R, Mainardi M, Tiberi A, Convertino D, Arevalo JC, Marchetti L, Costa M, Cattaneo A, Capsoni S. "Human TrkAR649W mutation impairs nociception, sweating and cognitive abilities: a mouse model of HSAN IV". Human Molecular Genetics 2022 ddac295. doi: 10.1093/hmg/ddac295. IF(2022) 3.500.

40. Testa G*, **Mainardi M***, Vannini E, Pancrazi L, Cattaneo A, Costa M. "Disentangling the signaling complexity of Nerve Growth Factor Receptors by CRISPR/Cas9". *The FASEB Journal* 2022 36(11):e22498. doi: 10.1096/fj.202101760RR. *Equal contribution. IF(2022) 4.800.

39. Maffei M* and **Mainardi M***. "How physical and motor training affect cognitive performance: lessons from an inflammatory molecule". *Neural Regeneration Research* 2022 17(12):2689-90. doi: 10.4103/1673-5374.339486. In press. *Corresponding author. IF(2022) 6.100.

38. Cattaneo A* and **Mainardi M*.** "Editorial: From Whole-Cell to Single Synapse Engrams - Breaking the Code for Memory Formation, Storage and Recall"**.** *Frontiers in Molecular Neuroscience*, 2022 Mar 1. doi: https://doi.org/10.3389/fnmol.2022.845516. *Corresponding author. IF(2022) 4.800.

37. Scabia G, Testa G, Scali M, Del Turco S, Desiato G, Berardi N, Sale A, Matteoli M, Maffei L, Maffei M*, **Mainardi M*.** "Reduced ccl11/eotaxin mediates the beneficial effects of environmental stimulation on the aged hippocampus". *Brain, Behavior, and Immunity*, 2021 Aug 19;98:234-244. doi: 10.1016/j.bbi.2021.08.222. *Corresponding author. IF(2021) 19.227.

36. Conti S, Spalletti C, Pasquini M, Giordano N, Barsotti N, **Mainardi M**, Lai S, Giorgi A, Pasqualetti M, Micera S, Caleo M. "Combining robotics with enhanced serotonin-driven cortical plasticity improves post-stroke motor recovery". *Progress in Neurobiology*, 2021 Aug;203:102073. doi: 10.1016/j.pneurobio.2021.102073. IF(2021) 10.885.

35. Cintoli S, Radicchi C, Noale M, Maggi S, Meucci G, Tognoni G, Bonuccelli U, Sale A, Berardi N, Maffei L; **The Train the Brain Consortium*** "Effects of combined training on neuropsychiatric symptoms and

quality of life in patients with cognitive decline" *Aging Clinical and Experimental Research*, 2021 33(5):1249-57. doi: 10.1007/s40520-019-01280-w. *****Marco Mainardi is a member of the "Train the Brain Consortium". IF(2021) 4.481.

34. Giordano A, Venema W, Severi I, Perugini J, Di Mercurio E, **Mainardi M**, Maffei M, Cinti S. "Ciliary neurotrophic factor acts on distinctive hypothalamic arcuate neurons and promotes leptin entry into and action on the mouse hypothalamus" *Frontiers in Cellular Neuroscience*, 2020 May 21;14:140. doi: 10.3389/fncel.2020.00140. IF(2020) 5.505; IF(2021) 6.147.

33. De Vincentiis S, Falconieri A, Mainardi M, Cappello V, Scribano V, Bizzarri R, Storti B, Dente L, Costa M, Raffa V. "Extremely low forces induce extreme axon growth" *Journal of Neuroscience*, 2020 Jun 24;40(26):4997-5007. doi: 10.1523/JNEUROSCI.3075-19.2020. IF(2020) 6.167; IF(2021) 6.709.

32. Convertino D, Fabbri F, Mishra N, **Mainardi M**, Cappello V, Testa G, Capsoni S, Albertazzi L, Luin S, Marchetti L, Coletti C. "Graphene Promotes Axon Elongation through Local Stall of Nerve Growth Factor Signaling Endosomes" *Nano Letters*, 2020, 20(5):3633-41. doi: 10.1021/acs.nanolett.0c00571. IF(2020) 11.189; IF(2021) 12.262.

31. Testa G, **Mainardi M**, Morelli C, Olimpico F, Pancrazi L, Petrella C, Severini C, Florio R, Malerba F, Stefanov A, Strettoi E, Brandi R, Arisi I, Heppenstall P, Costa M, Capsoni S, Cattaneo A. "The NGF^{R100W} Mutation Specifically Impairs Nociception without Affecting Cognitive Performance in a Mouse Model of Hereditary Sensory and Autonomic Neuropathy Type V" *Journal of Neuroscience*, 2019 Dec 4;39(49):9702-9715. doi: 10.1523/JNEUROSCI.0688-19.2019. IF(2019) 5.674; IF(2021) 6.709.

30. Marchetti L, Bonsignore F, Gobbo F, Amodeo R, Calvello M, Jacob A, Signore G, Schirripa Spagnolo C, Porciani D, **Mainardi M**, Beltram F, Luin S, Cattaneo A. "Fast-diffusing $p75^{NTR}$ monomers support apoptosis and growth cone collapse by neurotrophin ligands" *PNAS - Proceedings of the National Academy of Sciences of the USA*, 2019 Oct 22;116(43):21563-21572. doi: 10.1073/pnas.1902790116. IF(2019) 9.412; IF(2021) 12.779.

29. Maffei M*, **Mainardi M*** "Editorial: Metabolic Mediators and Synapses: Linking Body Periphery to Neural Plasticity" *Frontiers in Cellular Neuroscience*, 2019 Aug 27;13:378. doi: 10.3389/fncel.2019.00378. *Corresponding author. IF(2019) 3.921; IF(2021) 6.147.

28. Testa G, Olimpico F, Pancrazi L, Borello U, Cattaneo A, Caleo M, Costa M*, **Mainardi M***. "Cortical Seizures in *FoxG1*$^{+/-}$ Mice are Accompanied by Akt/S6 Overactivation, Excitation/Inhibition Imbalance and Impaired Synaptic Transmission." *International Journal of Molecular Sciences*, 2019 Aug 24;20(17). pii: E4127. doi: 10.3390/ijms20174127. *Corresponding author. IF(2019) 4.556; IF(2021) 6.208.

27. Cecchetti L, Lettieri G, Handjaras G, Leo A, Ricciardi E, Pietrini P, Pellegrini S; **The Train the Brain Consortium***. "Brain Hemodynamic Intermediate Phenotype Links Vitamin B_{12} to Cognitive Profile of Healthy and Mild Cognitive Impaired Subjects" *Neural Plasticity*, 2019 Jun 2;2019:6874805. doi: 10.1155/2019/6874805. ***Marco Mainardi** is a member of the "Train the Brain Consortium". IF(2019) 3.093; IF(2021) 3.144

26. Siano G, Varisco M, Caiazza MC, Quercioli V, **Mainardi M**, Ippolito C, Cattaneo A, Di Primio C. "Tau Modulates VGluT1 Expression" *Journal of Molecular Biology*, 2019 Feb 15;431(4):873-84. doi: 10.1016/j.jmb.2019.01.023. IF(2019) 4.760; IF(2021) 6.151.

25. Testa G, **Mainardi M***, Olimpico F, Pancrazi L, Cattaneo A, Caleo M, Costa M*. "A triheptanoin-supplemented diet rescues hippocampal hyperexcitability and seizure susceptibility in *FoxG1*$^{+/-}$ mice" *Neuropharmacology*, 2019 Apr;148:305-10. doi: 10.1016/j.neuropharm.2019.01.005. ***Corresponding author.** IF(2019) 4.431; IF(2021) 5.273.

24. Barone I*, Melani R*, **Mainardi M***, Scabia G*, Scali M, Dattilo A, Ceccarini G, Santini F, Maffei L, Pizzorusso T, Maffei M. "Fluoxetine modulates the activity of hypothalamic POMC neurons via mTOR signaling". *Molecular Neurobiology*, 2018 Apr 16. doi: 10.1007/s12035-018-1052-6. *Equal contribution. IF(2018) 4.586; IF(2021) 5.687.

23. Bruno RM, Stea F, Sicari R, Ghiadoni L, Taddei S, Ungar A, Bonuccelli U, Tognoni G, Cintoli S, Del Turco S,

Sbrana S, Gargani L, D'Angelo G, Pratali L, Berardi N, Maffei L, Picano E; **The Train the Brain Consortium***. **"**Vascular Function Is Improved After an Environmental Enrichment Program: The Train the Brain-Mind the Vessel Study**"**. *Hypertension*, 2018 Jun;71(6):1218-25. doi: 10.1161/HYPERTENSIONAHA.117.10066. *Marco Mainardi is a member of the "Train the Brain Consortium". IF(2018) 7.017; IF(2021) 9.897.

22. Scabia G, Barone I, **Mainardi M**, Ceccarini G, Scali M, Buzzigoli E, Dattilo A, Vitti P, Gastaldelli A, Santini F, Pizzorusso T, Maffei L, Maffei M. "The antidepressant fluoxetine acts on energy balance and leptin sensitivity via BDNF". *Scientific Reports*, 2018 Jan 29;8(1):1781. doi: 10.1038/s41598-018-19886-x. IF(2018) 4.011; IF(2021) 4.996.

21. Spinelli M, Fusco S, **Mainardi M**, Scala F, Natale F, Lapenta R, Mattera A, Rinaudo M, Li Puma DD, Ripoli C, Grassi A, D'Ascenzo M, Grassi C. "Brain insulin resistance impairs hippocampal synaptic plasticity and memory by increasing GluA1 palmitoylation through FoxO3a". *Nature Communications*, 2017 Dec 8;8(1):2009. doi: 10.1038/s41467-017-02221-9. IF(2017) 12.353; IF(2021) 17.694.

20. Mainardi M*, Spinelli M, Scala F, Mattera A, Fusco S, D'Ascenzo M, Grassi C*. "Loss of Leptin-Induced Modulation of Hippocampal Synaptic Trasmission and Signal Transduction in High-Fat Diet-Fed Mice". *Frontiers in Cellular Neuroscience*, 2017 Jul 28;11:225. doi: 10.3389/fncel.2017.00225. *Corresponding author. IF(2017) 4.300; IF(2021) 6.147.

19. Piacentini R, Li Puma DD, **Mainardi M**, Lazzarino G, Tavazzi B, Arancio O, Grassi C. **"**Reduced gliotransmitter release from astrocytes mediates tau-induced synaptic dysfunction in cultured hippocampal neurons.**"** *Glia*, 2017 Aug;65(8):1302-1316. doi: 10.1002/glia.23163. IF(2017) 5.846; IF(2021) 8.073.

18. Pierucci F, Garcia-Gil M, Frati A, Bini F, Martinesi M, Vannini E, **Mainardi M**, Luzzati F, Peretto P, Caleo M, Meacci E. "Vitamin D3 protects against Aβ peptide cytotoxicity in differentiated human neuroblastoma SH-SY5Y cells: A role for S1P1/p38MAPK/ATF4 axis." *Neuropharmacology*, 2017 Jan 7;116:328-42. Doi: 10.1016/j.neuropharm.2017.01.003. IF(2017) 4.249; IF(2021) 5.273.

17. The Train the Brain Consortium: Maffei L, Picano E, Andreassi MG, Angelucci A, Baldacci F, Baroncelli L, Beconcini S, Begenisic T, Bellinvia PF, Berardi N , Biagi L, Bonaccorsi J, Bonanni E, Bonuccelli U, Borghini A, Braschi C, Broccardi M, Bruno RM, Caleo M, Carlesi C, Carnicelli L, Cartoni G, Cecchetti L, Cenni MC, Ceravolo R, Chico L, Cintoli S, Cioni G, Costa M, D'Angelo G, D'Ascanio P, De Nes M, Del Sarto M, Del Turco S, Di Coscio E, Di Galante M, di Lascio N, Faita F, Falorni I, Faraguna U, Fenu A, Fortunato L, Franco R, Gargani L, Gargiulo R, Ghiadoni L, Giorgi FS, Iannarella R, Iofrida C, Kusmic C, Limongi F, Maestri M, Maffei M, Maggi S, **Mainardi M**, Mammana L, Marabotti A, Mariotti V, Melissari E, Mercuri A, Molinaro S, Narducci R, Navarra T, Noale M, Pagni C, Palumbo S, Pasquariello R, Pellegrini S, Pietrini P, Pizzorusso T, Poli A, Pratali L, Retico A, Ricciardi E, Rota G, Sale A, Sbrana S, Scabia G, Scali M, Scelfo D, Sicari R, Siciliano G, Stea F, Taddei S, Tognoni G, Tonacci A, Tosetti M, Turchi S, Volpi L (coordinators: Lamberto Maffei and Eugenio Picano). "Randomized trial on the effects of a combined physical/cognitive training in aged MCI subjects: the Train the Brain study", *Scientific Reports*, 2017 Jan 3;7:39471. doi: 10.1038/srep39471. IF(2017) 4.122; IF(2021) 4.997

16. Sansevero G, Begenisic T, **Mainardi M**, Sale A. "Experience-dependent reduction of soluble β-amyloid oligomers and rescue of cognitive abilities in middle-age Ts65Dn mice, a model of Down syndrome". *Experimental Neurology*, 2016 Jun 7;283(Pt A):49-56. doi: 10.1016/j.expneurol.2016.06.006. IF(2014) 4.000; IF(2021) 5.620.

15. Sanguinetti E, Liistro T, **Mainardi M**, Pardini S, Salvadori PA, Vannucci B, Burchielli S, Iozzo P. "Maternal high-fat feeding leads to alterations of brain glucose metabolism in the offspring: positron emission tomography study in a porcine model". *Diabetologia*, 2016 Apr;59(4):813-21. doi: 10.1007/s00125-015-3848-5. Epub 2016 Jan 5. IF(2016) 6.080; IF(2021) 10.460.

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13. Mainardi M, Fusco S, Grassi C**.** "Modulation of hippocampal neural plasticity by glucose-related signaling". *Neural Plasticity*, 2015:657928. doi: 10.1155/2015/657928. IF(2015) 3.568; IF(2021) 3.144.

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11. Mainardi M*, Di Garbo A, Caleo M, Berardi N, Sale A, Maffei L. "Environmental enrichment strengthens corticocortical interactions and reduces amyloid-β oligomers in aged mice". *Frontiers in Aging Neuroscience*, 2014 Jan 23;6:1. doi: 10.3389/fnagi.2014.00001. ***Corresponding author**. IF(2014) 4.000; IF(2021) 5.702.

10. Spalletti C, Lai S, **Mainardi M**, Panarese A, Ghionzoli A,Gianfranceschi L, Chisari C, Caleo M, Micera S. "A robotic system for post-stroke assessment and restoration of forelimb function in mice". *Neurorehabilitation and Neural Repair*, 2014 Feb;28(2):188-96. doi: 10.1177/1545968313506520. IF(2014) 3.976; IF(2021) 4.895.

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8. Scali M, Begenisic T, **Mainardi M**, Milanese M, Bonifacino T, Bonanno G, Sale A, Maffei L. **"**Fluoxetine treatment promotes functional recovery in a rat model of cervical spinal cord injury". *Scientific Reports*, 2013 July 17;3:2217. doi: 10.1038/srep02217. IF(2013) 5.078; IF(2020) 4.996.

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6. Mainardi M, Pietrasanta M, Vannini E, Rossetto O, Caleo M. "Tetanus Neurotoxin-induced epilepsy in mouse visual cortex". *Epilepsia*, 2012 Jul;53(7):e132-6. doi: 10.1111/j.1528-1167.2012.03510.x. IF(2012) 3.909; IF(2021) 6.740.

5. Cappello S, Böhringer CR, Bergami M, Conzelmann KK, Ghanem A, Tomassy GS, Arlotta P, **Mainardi M**, Allegra M, Caleo M, van Hengel J, Brakebusch C, Götz M. "A radial glia-specific role of RhoA in double cortex formation". *Neuron*, 2012 Mar 8;73(5):911-24. doi: 10.1016/j.neuron.2011.12.030. IF(2012) 15.766; IF(2021) 18.688.

4. Di Garbo A*****, **Mainardi M***, Chillemi S, Caleo M. "Environmental enrichment modulates cortico-cortical interactions in the mouse". *PLoS ONE*, 2011;6(9):e25285. doi: 10.1371/journal.pone.0025285. Epub 2011 Sep 22. PMID: 21966482. ISSN 1932-6203 (online). ***Equal contribution**. IF(2011) 4.092; IF(2021) 3.752.

3. Mainardi M, Scabia G, Vottari T, Santini F, Pinchera A, Maffei L, Pizzorusso T, Maffei M. "A sensitive period for environmental regulation of eating behaviour and leptin sensitivity". *PNAS - Proceedings of the National Academy of Sciences of the USA*, 2010 Sep 21;107(38):16673-8. doi: 10.1073/pnas.0911832107. IF(2010) 9.771; IF(2021) 12.779.

2. Mainardi M, Landi S, Gianfranceschi L, Baldini S, De Pasquale R, Berardi N, Maffei L, Caleo M. "Environmental enrichment potentiates thalamocortical transmission and plasticity in the adult rat visual cortex"**.** *Journal of Neuroscience Research*, 2010 Nov 1;88(14):3048-59. doi: 10.1002/jnr.22461. IF(2010) 2.958; IF(2021) 4.433.

1. Mainardi M, Landi S, Berardi N, Maffei L, Pizzorusso T. "Reduced responsiveness to long-term monocular deprivation of parvalbumin neurons assessed by c-Fos staining in rat visual cortex"**.** *PLoS ONE*, 2009;4(2):e4342. doi: 10.1371/journal.pone.0004342. IF(2009) 4.351; IF(2021) 3.752.

Book chapters _____

2. Testa G, Costa M, **Mainardi M***. "Triheptanoin as a nutraceutical and its potential use in epilepsy" in Martin C, Patel V, Preedy V (eds.), "Treatments, Nutraceuticals, Supplements and Herbal Medicine in Neurological Disorders", Academic Press, 2023. ISBN 9780323900522 (hardback), 9780323884440 (eBook).

1. D'Ascenzo M, **Mainardi M**, Grassi C. "Critical Role of d-Serine Signaling in Synaptic Plasticity Relevant to Cocaine Addiction" in Preedy V (ed.), "The Neuroscience of Cocaine", Academic Press, 2017. ISBN 9780128037508.

Oral communications _____

2023: 16. Invited speaker to the webinar "I mercoledì della SIO (Società Italiana Obesità / Italian Society for Obesity)", title of the talk "Metabolism and synaptic plasticity", June 28.

2019: 15. Chair of the symposium "From whole-cell to single synapse engrams – Breaking the code for memory formation, storage and recall*", SIF-FEPS 2019 – joint meeting of the Federation of European Physiological Societies and the Italian Physiological Society, Bologna, 10-13 September; *SIF-sponsored symposium;

2018: 14. Oral communication "444.04 – Purification and proteomic profiling of PSD-95 intereactors at in vivo potentiated synapses", Neuroscience 2018 – 48th Meeting of the Society for Neuroscience, San Diego (CA, USA), 6 November;

13. Chair of the Nanosymposium "444 - LTP: Intracellular Signaling, Pre- and Postsynaptic Mechanisms", Neuroscience 2018 – 48th Meeting of the Society for Neuroscience, San Diego (CA, USA), 6 November;

12. Oral communication "Purification and proteomic profiling of PSD-95 interactors at in vivo potentiated synapses", annual retreat of the CNR Institute of Neuroscience, Bergamo, 26-28 September;

11. Invited speaker, Summer School "TEX2018 – Under the Surface of Memory Phenomena", SISSA, Trieste, 2 July.

2015: 10. Invited speaker, International Conference on New Therapies for Parkinson and Alzheimer Diseases, Pisa, 18-19 September.

2014: 9. Invited speaker, workshop "A dynamic architecture of life?", Accademia Nazionale dei Lincei, Rome, 26-27 May.

2013: 8. Oral communication, annual retreat of the CNR Institute of Neuroscience, Cagliari, 18-20 September;

7. Invited speaker, International Conference on New Therapies for Parkinson and Alzheimer Diseases, Pisa, 6-7 September;

6. Seminar, Institute of Human Physiology, Catholic University of the Sacred Heart, Rome, 26 June.

2012: 5. Wiiner of a travel grant to participate as a speaker to the Annual Congress of the Italian Society for Neuroscience "SINS 2012", Catania, 19-22 April;

4. Oral communication, annual retreat of the CNR Institute for Neuroscience, Bressanone, 2 March.

2011: 3. Invited speaker, Donders Discussions, Radbound University, Nijmegen, Netherlands, 13-14 October;

2. Seminar, INMED – Institut Neurobiologique de la Méditerranée, Marseille, France, 25-27 January.

2010: 1. Invited speaker, european meeting of the "Plasticise Consortium" Pisa, 28-30 September.

Patent

Italian patent n° FI2014A000234/102014902300735, code WIPO 10FI2014A000234, "Dispositivo automatizzato per la riabilitazione motoria e per la valutazione della funzionalità degli arti anteriori in modelli animali". Role: co-inventor.

QUALIFICATIONS

Abilitazione Scientifica Nazionale per professore di II fascia in Fisiologia (settore concorsuale 05/D1, settore scientifico disciplinare BIO-09); qualification for associate professor in Physiology.

Professional qualification, Biologist.

RESEARCH SUPPORT

- 2023-25: CNR intramural project "Nutrage", co-PI of the Neuroscience Institute-Pisa unit, 86.8k€

  PNRR-MAD-2022-12376459, "Reprogramming energy homeostasis in overweight children and adults through exercise, cognitive training and social interaction", funded by the Italian Ministry of Health, under-40 collaborator of the CNR unit, 298.3k€

  AGYR2022 - AIRAlzh Grants for Young Researchers, "Elucidating how a healthy lifestyle can mitigate synaptic dysfunction caused by Alzheimer's disease – A proteomic study in transgenic mice exposed to environmental enrichment", funded by AIRAlzh - Associazione Italiana Ricerca Alzheimer Onlus, PI, 39.6k€.

- 2022-25: ECS_00000017, Decreto Direttoriale MUR n. 1055, 23/06/2022, "THE - Tuscany Health Ecosystem", spoke 8, subproject 7, funded by the Italian Ministry of University and Research, collaborator of the CNR unit, 1000k€

- 2022-24: Grant from "Marina Romoli ONLUS" Foundation for research on spinal cord injury, co-PI, 40k€.
- 2021-24: WFL-IT-16-21, "Stretch-growth and cell therapy: a novel combinatorial approach for treating spinal cord injuries" awarded by Wings for Life Foundation, co-PI, 300k€.
- 2018-20: Intramural competitive, peer-reviewed grant "Fondi di Ricerca Annuali e Biennali", Scuola Normale Superiore, Pisa, PI, 50k€

AWARDS AND PRIZES

2013 – Winner of a "Lincei – Royal Society" travel fellowship for research activity in Great Britain (DECLINED to accept the "Giuseppe Levi" post-doctoral fellowship, awarded by Accademia Nazionale dei Lincei).
2011 – Winner of a "EMBO" post-doctoral fellowship for research activity abroad (DECLINED).
2009 – Winner of a travel grant for the Annual Congress of the Italian Society for Neuroscience "SINS 2009", Milan 2-5 October.
2006 – Winner of the study award "In Memoriam of the Biologist A. Marzullo", awarded by University of Trieste.

MEMBERSHIPS

SfN - Society for Neuroscience; SIF – Società Italiana di Fisiologia / Italian Society for Physiology.

PEER-REVIEW AND EDITORIAL ACTIVITY

Journal of Neuroscience Research; Neural Plasticity; Psychoneuroendocrinology; Brain, Behavior, and Immunity; Journal of Nutritional Biochemistry; Neural Regeneration Research; American Journal of Physiology – Regulatory, Integrative and Comparative Physiology; Canadian Journal of Physiology and Pharmacology, Frontiers in Cellular Neuroscience, Journal of Cell Biology and Histology, Molecular Vision, Frontiers in Physiology, Frontiers in Neural Circuits; Scientific Reports, Molecules; Neuroscience

Editor for BMC Neuroscience (2021-present)
Editor for the "Molecular Neurobiology" section, International Journal of Molecular Sciences (2020-present)
Guest Associate Editor of the Research Topic "From Whole-Cell to Single Synapse Engrams - Breaking the Code for Memory Formation, Storage and Recall", in collaboration with Prof. Antonino Cattaneo (Scuola Normale Superiore), Frontiers in Molecular Neuroscience. (2018-20)
Guest Associate Editor of the Research Topic "Metabolic Mediators and Synapses: Linking Body Periphery to Neural Plasticity", in collaboration with Dr. Margherita Maffei (IFC-CNR), Frontiers in Cellular Neuroscience. (2018-22)
Review Editor, Frontiers in Neural Circuits (2018-present)
Application reviewer for the "Research Fellowship" program, Alzheimer's Association (2017-present)
Application reviewer, Starting and Consolidator Grant programs, European Research Council (2021-present)

TEACHING

Academic years 2022-23, 2021-22, 2020-21, 2019-20 (University of Pisa): - "Neurobiology III" (24-h module), Master's degree in Neuroscience.
Academic years 2021-22, 2020-21 (Scuola Normale Superiore, Pisa): - Seminars in "Neurophysiology of sensory perception" (2021-22, 10 h; 2020-21, 18 h).
Academic year 2018-19 (Scuola Normale Superiore, Pisa): - supplementary lectures to the course "Molecular and Cellular Neuroscience" (20 h), for the Honors Degree course in Biology and for the PhD course in Neuroscience;
- "Experimental Methods and Design in Neurobiology" (20 h), PhD course in Neuroscience;

- "From Neurophysiology to Perceptions", for the Honors Degree course in Biology (20 h).

Academic year 2017-18 (Scuola Normale Superiore, Pisa): - supplementary lectures for the course "Molecular and Cellular Neuroscience" (20 h), for the Honors Degree course in Biology and for the PhD course in Neuroscience;

- "Biology Seminar", for the Honors Degree course in Biology (24 h);

- "Laboratory of Biology I" (4 modules, 10 h each) e "II" (80 h), for the Honors Degree course in Biology.

- "Experimental Methods and Design in Neurobiology" (20 h), for the PhD course in Neuroscience.

Academic years 2015-16 and 2016-17 (Catholic University of the Sacred Heart, Rome):

- "Organic and Functional Systems II - Respiratory System Physiology" (22 h), for the English-taught course in "Medicine and Surgery";

- Practicals in "Electromagnetism and Physiology of Excitable Cells" and "Organic and Functional Systems I, II and III" (A.A. 2016-17, 116 h; A.A. 2015-16, 121 h), for the English-taught course in "Medicine and Surgery".

Academic year 2014-15 (Catholic University of the Sacred Heart, Rome): - "Human Physiology" for the BSc course in "Technician in Medical Radiology, Imaging and Radiotherapy" (25 h);

- Practicals in Electromagnetism and Physiology of Excitable Cells" and "Organic and Functional Systems I, II and III" for the English-taught course in "Medicine and Surgery" (64 h).

TUTORING AND MENTORING

Co-supervisor for 1 post-doc, CNR Neuroscience Institute/University of Pisa

Supervisor for 1 MSc student in Neuroscience, University of Trieste

Co-tutoring for 1 MSC student in Neuroscience, University of Pisa.

Supervisor for 2 students of Honors degree course in Biology, Scuola Normale Superiore, Pisa.

Co-tutoring for 4 PhD students in Neuroscience, Scuola Normale Superiore.

Tutoring for 5 students for the "Physiology Internship", courses in "Medicina e Chirurgia" and "Medicine and Surgery", Catholic University of the Sacred Heart, Rome.

Tutoring for 2 BSc students in Medical Biotechnology, Catholic University of the Sacred Heart.

BOARDS AND COMMITTEES

Member of the Neuroscience PhD board, Scuola Normale Superiore, 2019-2023.

Member of the committee for admission to the Honors Degree (Corso Ordinario) in Biology (I year) and Molecular Biology / Neuroscience (IV year) of Scuola Normale Superiore, Pisa, academic years 2019-20, 2018-19.

Member of the selection committee for the PhD program in Neuroscience, Scuola Normale Superiore, academic year 2018-19.

Member of the committee for the admission to Medicine and Surgery and Dentistry courses of the Catholic University of the Sacred Heart, Rome, academic year 2015-16.

Member of the selection committee for the MSc program in Neuroscience, University of Pisa, 2020 – present.

EDUCATIONAL PUBLICATIONS

"Contro il declino cognitivo una soluzione c'è: allenarsi", interviewed by Jacopo Vergari, La Repubblica Salute, September 30, 2022.

Contributor to the book “Europa – un’Utopia in Costruzione”, volume II “Scienze, Innovazione, Reti”, Istituto dell’Enciclopedia Italiana (Roma, 2019) with the monography “Il problema dell’obesità”, in collaboration with Dr. Margherita Maffei (Institute of Clinical Physiology, National Research Council).

Grassi C, Mainardi M. “Tra cervello, geni ed emozioni, quante variabili entrano in gioco”. La Repubblica, May 05, 2015, page 39.

OUTREACH _____

Member of the organizing committee for the “Neuroscience Olympic Games 2019” Pisa, May 3-4.

Demonstrator at “BRIGHT – Researchers’ Night”, CNR – Area della Ricerca di Pisa, September 2017 and 2019.

Member of the organizing committee of the CNR-sponsored event “Obesità: quando come e perché. Le cause, gli effetti e i modi per contrastarla” for EXPO 2015, Milano, May 20, 2015.

Instructor at “68th Corso di Orientamento Universitario – University steering course for high school students”, organized by Scuola Normale Superiore di Pisa in Colle Val d’Elsa (Florence), Jul 9-16, 2010.

Pisa, July 10, 2023

I hereby state that the information contained in this document is correct and corresponds to reality.

Marco Mainardi, *PhD*