

Curriculum Vitae Francesca Munari

PERSONAL INFORMATION

Family name, first name: Munari, Francesca

Citizenship: Italian

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EDUCATION

30.03.2009: PhD degree in Molecular Sciences, Curriculum Chemical Science, University of Padova, Italy;

26.10.2005: Master's Degree in Biotechnology, Curriculum Pharmaceutical Biotechnology (grade of 110/110 cum laude), University of Padova, Italy;

2000: High School Diploma (grade of 100/100), ITAS "Boscardin", Vicenza, Italy.

CURRENT POSITION

From 01.10.2023: RTD-B Researcher CHIM/06 (assistant professor in organic chemistry) at the Department of Biotechnology, University of Verona, Italy.

PREVIOUS POSITIONS/ RESEARCH EXPERIENCES

01.07.2019-30.09.2023: RTD-A Researcher CHIM/06 at the Department of Biotechnology, University of Verona, Italy.

01.11.2014-30.06.2019: Postdoctoral Research Fellow at the Department of Biotechnology, University of Verona, Italy. Supervisor: M. Assfalg and M. D'Onofrio.

01.10.2012-30.09.2014: Postdoctoral Researcher at the German Center for Neurodegenerative Diseases (DZNE) within the Helmholtz association, Göttingen, Germany. Supervisor: M. Zweckstetter.

07.05.2009-30.09.2012: Postdoctoral Researcher at the NMR based Structural Biology Department, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany. Supervisor: M. Zweckstetter.

03.04.2008-09.10.2008: PhD visiting student at the NMR based Structural Biology Department, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany.

02.01.2006-31.12.2008: PhD student at the "Graduate School of Molecular Sciences", University of Padova, Italy. Supervisor: S. Mammi.

SPECIALIZED COURSES ATTENDED

- "Advance Protein NMR: structure and dynamics", Swedish NMR Centre of the University of Gothenburg, Sweden, 17-28 January 2011.

- SAXIER/BIOSAS Copenhagen practical course on "Bio-macromolecules in solution studied with Small-Angle Scattering", Copenhagen, Denmark, 16-22 January 2010.

- EMBO World Practical Course: "Structure and Dynamics of Biomolecules by NMR Spectroscopy" Rosario, Argentina, 21-30 September 2009.

NATIONAL SCIENTIFIC QUALIFICATION

18/11/2020 National Scientific Qualification as associate professor in Organic Chemistry ("Abilitazione Scientifica Nazionale", II fascia 03/C1).

AWARDS

- Premio DCSB-Italfarmaco "Gastone De Santis" 2022. The award was given from Divisione di Chimica dei Sistemi Biologici e Società Italfarmaco SpA to young researcher who carried out research activities relevant to the Chemistry of Biological Systems.

GRANTS

- From 18.10.2023: co-PI of the project "Glial phagocytic clearance of protein aggregates: defining the actors" funded by MUR- *Ministero dell'Università e della Ricerca* - PRIN 2022 call.
- 01.07.2020–31.12.2022: Principal investigator of the project "Structural study of Fyn-Tau, a key macromolecular complex in Alzheimer's disease" funded by the University of Verona within the call RICERCA DI BASE 2019.
- 01.02.2017-30.06.2018: Fondazione Umberto Veronesi *fellowship 2017*; project title: "Role of polyubiquitin in the aggregation of Tau protein".

TEACHING at the University of Verona

- 21.12.2018: lecture for the PhD course in Biotechnology.
- 2021-2022-2023-2024-2025: lectures for the PhD in Nanoscience and Advanced Technologies.
- 2020-2021-2022-2024: 60 hours/year in Organic Chemistry (laboratory modules) for the Bachelor's degree in Biotechnology.
- 2025: 84 hours/year in Organic Chemistry (laboratory modules) for the Bachelor's degree in Biotechnology.
- 2024-2025: 32 hours/year in Organic Chemistry for the Bachelors' degree in Innovation and sustainability in the industrial production of food.
- 2021-2022-2023-2024: 8 hours/year in Supramolecular chemistry of biological systems for the Master's degree in Molecular and Medical Biotechnology.

ORAL PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES

- Munari F. NMR of protein-protein interactions of Tau, a key player of Alzheimer's disease. JOINT ITALIAN-FRENCH MEETING ON MAGNETIC RESONANCE. Milan, 27-30 September 2022.
- Munari F. Ubiquitination of the Alzheimer's disease related protein Tau by enzymatic and chemical methods: effects on the mechanism of amyloids formation. *Convegno Nazionale della Divisione di Chimica dei Sistemi Biologici 2022 della Società Chimica Italiana*. Naples (Italy) 20–22 June 2022.
- Munari F. Impact of ubiquitination on the aggregation of Tau protein, a key player in Alzheimer's disease. *European chemical biology symposium ECBS*, Virtual, 26-28 May 2021.
- Munari F. Semi-synthesis of ubiquitinated proteins for structural studies. *Workshop "I CHIMICI PER LE BIOTECNOLOGIE"* Milano, Italy, 22 Feb. 2019.
- Munari F. STRUCTURAL AND MOLECULAR RECOGNITION PROPERTIES OF UBB⁺¹, A UBIQUITIN MUTANT ASSOCIATED WITH ALZHEIMER'S DISEASE, *XLVII National Congress on Magnetic Resonance* Torino, 19-21 September 2018.
- Munari F. Identification of primary and secondary UBA footprints on the surface of ubiquitin. *Convegno Nazionale della Divisione di Chimica dei Sistemi Biologici 2016 della Società Chimica Italiana*, Verona, Italy, 21-23 Sept. 2016.
- Munari F. Conformational plasticity of the multi-domain Heterochromatin Protein 1 β . *9th European Biophysics Congress*. Lisbon, Portugal, 13–17 July 2013.
- Munari F. NMR studies of HP1-histone3 interaction in the high molecular weight nucleosome system. *GIDRM XLI National Congress on magnetic resonance*, Pisa, Italy, 17-19 Sept 2012.
- Munari F. Structural analysis of hHP1 β -nucleosome complex in dependence of histone 3 methylation. *2nd Göttinger Chromatin Club Symposium*, Göttingen, Germany, 14 Sept 2012.
- Munari F. Molecular basis of hHP1 β /nucleosome interaction in dependence of histone 3 methylation. *8th SIBBM Seminars: Frontiers in Molecular Biology "Epigenetics in Development and Disease"*, Palermo, Italy, 24-26 May 2012.

ORGANIZATION OF CONFERENCES

21-23 September 2016: *Convegno Nazionale della Divisione di Chimica dei Sistemi Biologici 2016 della Società Chimica Italiana*, Verona, Italy.

LIST OF PUBLICATIONS

**correspondent author*

- 42:** Tira R, Leo G, Prandini L, Barracchia CG, D'Onofrio M, Mollica L, Capaldi S, Assfalg M, **Munari F.*** Multiple and Alternative Sites Make Tau Protein an Adaptable Sticky Surface for the SH3 Domain of Fyn Kinase. *Angew Chem Int Ed Engl.* 2025 May 5:e202504292. doi: 10.1002/anie.202504292.
- 41:** Trivellato D, **Munari F**, Assfalg M, Capaldi S, D'Onofrio M. Untangling the Complexity and Impact of Tau Protein Ubiquitination. *Chembiochem.* 2024 Nov 18;25(22):e202400566. doi: 10.1002/cbic.202400566
- 40:** Viola G, Trivellato D, Meulli L, Tira R, Lauriola A, **Munari F**, Montagnana M, Buffelli M, Assfalg M, D'Onofrio M. Stable ubiquitin conjugation for biological interrogation of ubiquitinated tau repeat domain. *Bioorg Chem.* 2024 Sep;150:107549.
- 39:** Ukmar-Godec T, Yu T, de Opakua AI, Pantoja CF, **Munari F**, Zweckstetter M. Conformational diversity of human HP1 α . *Protein Sci.* 2024 Jul;33(7):e5079. doi: 10.1002/pro.5079.
- 38:** Parolini F, Kachoe EA, Leo G, Civiero L, Bubacco L, Arrigoni G, **Munari F**, Assfalg M, D'Onofrio M, Capaldi S. Site-Specific Ubiquitination of Tau Amyloids Promoted by the E3 Ligase CHIP. *Angew Chem Int Ed Engl.* 2023 Dec 11;62(50):e202310230.
- 37:** Tira R, Viola G, Barracchia CG, Parolini F, **Munari F**, Capaldi S, Assfalg M, D'Onofrio M. Espresso Coffee Mitigates the Aggregation and Condensation of Alzheimer's Associated Tau Protein. *J Agric Food Chem.* 2023 Jul 19. doi: 10.1021/acs.jafc.3c01072.
- 36:** Viola G, Floriani F, Barracchia CG, **Munari F**, D'Onofrio M, Assfalg M. Ultrasmall Gold Nanoparticles as Clients of Biomolecular Condensates. *Chemistry.* 2023 Jun 9:e202301274. doi: 10.1002/chem.202301274.
- 35:** Trivellato D, Floriani F, Giorgio Barracchia C, **Munari F**, D'Onofrio M, Assfalg M. Site-directed double monoubiquitination of the repeat domain of the amyloid-forming protein tau impairs self-assembly and coacervation. *Bioorg Chem.* 2023 Jan 7;132:106347. doi: 10.1016/j.bioorg.2023.106347.
- 34:** Viola G, Barracchia CG, Tira R, Parolini F, Leo G, Bellanda M, **Munari F**, Capaldi S, D'Onofrio M, Assfalg M. New Paradigm for Nano-Bio Interactions: Multimolecular Assembly of a Prototypical Disordered Protein with Ultrasmall Nanoparticles. *Nano Lett.* 2022 Nov 23;22(22):8875-8882. doi: 10.1021/acs.nanolett.2c02902.
- 33:** Barracchia CG, Parolini F, Volpe A, Gori D, **Munari F**, Capaldi S, D'Onofrio M, Assfalg M. Camouflaged Fluorescent Silica Nanoparticles Target Aggregates and Condensates of the Amyloidogenic Protein Tau. *Bioconj Chem.* 2022 Jul 20;33(7):1261-1268. doi: 10.1021/acs.bioconjchem.2c00168.
- 32:** **Munari F**, Mollica L, Valente C, Parolini F, Kachoe EA, Arrigoni G, D'Onofrio M, Capaldi S, Assfalg M. Structural Basis for Chaperone-Independent Ubiquitination of Tau Protein by its E3 Ligase CHIP. *Angew Chem Int Ed Engl.* 2022 Apr 4;61(15):e202112374. doi: 10.1002/anie.202112374.
- 31:** Marzo C.M, Gambini S, Poletti S, **Munari F**, Assfalg M, Guzzo F. Inhibition of Human Monoamine Oxidases A and B by Specialized Metabolites Present in Fresh Common Fruits and Vegetables. *Plants*, 2022, 11(3), 346.
- 30:** Parolini F, Tira R, Barracchia CG, **Munari F**, Capaldi S, D'Onofrio M, Assfalg M. Ubiquitination of Alzheimer's-related tau protein affects liquid-liquid phase separation in a site- and cofactor-dependent manner. *Int J Biol Macromol.* 2022 Mar 15;201:173-181. doi: 10.1016/j.ijbiomac.2021.12.191.
- 29:** Commisso M, Bianconi M, Poletti S, Negri S, **Munari F**, Ceoldo S, Guzzo F. Metabolomic Profiling and Antioxidant Activity of Fruits Representing Diverse Apple and Pear Cultivars. *Biology (Basel).* 2021 Apr 28;10(5):380. doi: 10.3390/biology10050380.
- 28:** D'Onofrio M, **Munari F**, Assfalg M. Alpha-Synuclein-Nanoparticle Interactions: Understanding, Controlling and Exploiting Conformational Plasticity. *Molecules.* 2020 Nov 29;25(23):5625. doi: 10.3390/molecules25235625.

- 27: Munari F**, Barracchia CG, Parolini F, Tira R, Bubacco L, Assfalg M, D'Onofrio M. Semisynthetic Modification of Tau Protein with Di-Ubiquitin Chains for Aggregation Studies. *Int J Mol Sci*. 2020 Jun 20;21(12):4400. doi:10.3390/ijms21124400.
- 26:** Barracchia CG, Tira R, Parolini F, **Munari F**, Bubacco L, Spyroulias GA, D'Onofrio M, Assfalg M. Unsaturated Fatty Acid-Induced Conformational Transitions and Aggregation of the Repeat Domain of Tau. *Molecules*. 2020 Jun 11;25(11):2716. doi: 10.3390/molecules25112716.
- 25:** Tira R, De Cecco E, Rigamonti V, Santambrogio C, Barracchia CG, **Munari F**, Romeo A, Legname G, Prosperi D, Grandori R, Assfalg M. Dynamic molecular exchange and conformational transitions of alpha-synuclein at the nano-bio interface. *Int J Biol Macromol*. 2020 Jul 1;154:206-216. doi:10.1016/j.ijbiomac.2020.03.118.
- 24: Munari F**, D'Onofrio M, Assfalg M. Solution NMR insights into dynamic supramolecular assemblies of disordered amyloidogenic proteins. *Arch Biochem Biophys*. 2020 Apr 15;683:108304. doi: 10.1016/j.abb.2020.108304.
- 23: Munari F**, Barracchia CG, Franchin C, Parolini F, Capaldi S, Romeo A, Bubacco L, Assfalg M, Arrigoni G, D'Onofrio M. Semisynthetic and Enzyme-Mediated Conjugate Preparations Illuminate the Ubiquitination-Dependent Aggregation of Tau Protein. *Angew Chem Int Ed Engl*. 2020 Apr 16;59(16):6607-6611. doi: 10.1002/anie.201916756.
- 22:** Perduca M, Destefanis L, Bovi M, Galliano M, **Munari F**, Assfalg M, Ferrari F, Monaco HL, Capaldi S. Structure and properties of the oyster mushroom (*Pleurotus ostreatus*) lectin. *Glycobiology*. 2020 Jul 16;30(8):550-562. doi:10.1093/glycob/cwaa006.
- 21:** Rezaei-Ghaleh N, **Munari F**, Becker S, Assfalg M, Griesinger C. A facile oxygen-17 NMR method to determine effective viscosity in dilute, molecularly crowded and confined aqueous media. *Chem Commun (Camb)*. 2019 Oct 10;55(82):12404-12407. doi: 10.1039/c9cc06124j.
- 20:** Tolö J, Taschenberger G, Leite K, Stahlberg MA, Spehlbrink G, Kues J, **Munari F**, Capaldi S, Becker S, Zweckstetter M, Dean C, Bähr M, Kügler S. Pathophysiological Consequences of Neuronal α -Synuclein Overexpression: Impacts on Ion Homeostasis, Stress Signaling, Mitochondrial Integrity, and Electrical Activity. *Front Mol Neurosci*. 2018 Mar 7;11:49. doi: 10.3389/fnmol.2018.00049.
- 19: Munari F**, Bortot A, Assfalg M, D'Onofrio M. Alzheimer's disease-associated ubiquitin mutant Ubb⁺¹: Properties of the carboxy-terminal domain and its influence on biomolecular interactions. *Int J Biol Macromol*. 2018 Mar;108:24-31. doi: 10.1016/j.ijbiomac.2017.11.121.
- 18:** Commisso M, Bianconi M, Di Carlo F, Poletti S, Bulgarini A, **Munari F**, Negri S, Stocchero M, Ceoldo S, Avesani L, Assfalg M, Zoccatelli G, Guzzo F. Multi-approach metabolomics analysis and artificial simplified phytocomplexes reveal cultivar-dependent synergy between polyphenols and ascorbic acid in fruits of the sweet cherry (*Prunus avium* L.). *PLoS One*. 2017 Jul 21;12(7):e0180889. doi:10.1371/journal.pone.0180889.
- 17:** D'Onofrio M, Zanzoni S, **Munari F**, Monaco HL, Assfalg M, Capaldi S. The long variant of human ileal bile acid-binding protein associated with colorectal cancer exhibits sub-cellular localization and lipid binding behaviour distinct from those of the common isoform. *Biochim Biophys Acta Gen Subj*. 2017 Sep;1861(9):2315-2324. doi: 10.1016/j.bbagen.2017.07.004.
- 16:** D'Onofrio M, Barracchia CG, Bortot A, **Munari F**, Zanzoni S, Assfalg M. Molecular differences between human liver fatty acid binding protein and its T94A variant in their unbound and lipid-bound states. *Biochim Biophys Acta Proteins Proteom*. 2017 Sep;1865(9):1152-1159. doi: 10.1016/j.bbapap.2017.06.025.
- 15:** Vicente Miranda H, Szego ÉM, Oliveira LMA, Breda C, Darendelioglu E, de Oliveira RM, Ferreira DG, Gomes MA, Rott R, Oliveira M, **Munari F**, Enguita FJ, Simões T, Rodrigues EF, Heinrich M, Martins IC, Zamolo I, Riess O, Cordeiro C, Ponces-Freire A, Lashuel HA, Santos NC, Lopes LV, Xiang W, Jovin TM, Penque D, Engelender S, Zweckstetter M, Klucken J, Giorgini F, Quintas A, Outeiro TF. Glycation potentiates α -synuclein-associated neurodegeneration in synucleinopathies. *Brain*. 2017 May 1;140(5):1399-1419. doi: 10.1093/brain/awx056.
- 14: Munari F**, Bortot A, Zanzoni S, D'Onofrio M, Fushman D, Assfalg M. Identification of primary and secondary UBA footprints on the surface of ubiquitin in cell-mimicking crowded solution. *FEBS Lett*. 2017 Apr;591(7):979-990. doi: 10.1002/1873-3468.12615.

- 13:** de Oliveira RM, Vicente Miranda H, Francelle L, Pinho R, Szegő ÉM, Martinho R, **Munari F**, Lázaro DF, Moniot S, Guerreiro P, Fonseca-Ornelas L, Marijanovic Z, Antas P, Gerhardt E, Enguita FJ, Fauvet B, Penque D, Pais TF, Tong Q, Becker S, Kügler S, Lashuel HA, Steegborn C, Zweckstetter M, Outeiro TF. The mechanism of sirtuin 2-mediated exacerbation of alpha-synuclein toxicity in models of Parkinson disease. *PLoS Biol.* 2017 Mar 3;15(3):e2000374. doi: 10.1371/journal.pbio.2000374.
- 12:** Moree B, Yin G, Lázaro DF, **Munari F**, Strohäker T, Giller K, Becker S, Outeiro TF, Zweckstetter M, Salafsky J. Small Molecules Detected by Second-Harmonic Generation Modulate the Conformation of Monomeric α -Synuclein and Reduce Its Aggregation in Cells. *J Biol Chem.* 2015 Nov 13;290(46):27582-93. doi:10.1074/jbc.M114.636027.
- 11:** Rezaei-Ghaleh N, Klama F, **Munari F**, Zweckstetter M. HYCUD: a computational tool for prediction of effective rotational correlation time in flexible proteins. *Bioinformatics.* 2015 Apr 15;31(8):1319-21. doi: 10.1093/bioinformatics/btu824.
- 10:** Bajaj R, **Munari F**[§], Becker S, Zweckstetter M. Interaction of the intermembrane space domain of Tim23 protein with mitochondrial membranes. *J Biol Chem.* 2014 Dec 12;289(50):34620-6. doi: 10.1074/jbc.M114.595702. ([§]equal first author contribution).
- 9:** Camacho-Zarco AR, **Munari F**, Wegstroth M, Liu WM, Ubbink M, Becker S, Zweckstetter M. Multiple paramagnetic effects through a tagged reporter protein. *Angew Chem Int Ed Engl.* 2015 Jan 2;54(1):336-9. doi: 10.1002/anie.201408615.
- 8:** Wysoczański P, Schneider C, Xiang S, **Munari F**, Trowitzsch S, Wahl MC, Lührmann R, Becker S, Zweckstetter M. Cooperative structure of the heterotrimeric pre-mRNA retention and splicing complex. *Nat Struct Mol Biol.* 2014 Oct;21(10):911-8. doi: 10.1038/nsmb.2889.
- 7:** Vicario M, Zagari A, Granata V, **Munari F**, Mammi S, Bubacco L, Skaper SD, Negro A. A novel prion protein-tyrosine hydroxylase interaction. *CNS Neurol Disord Drug Targets.* 2014;13(5):896-908. doi: 10.2174/1871527313666140711092955.
- 6:** Plotegher N, Kumar D, Tessari I, Brucale M, **Munari F**, Tosatto L, Belluzzi E, Greggio E, Bisaglia M, Capaldi S, Aioanei D, Mammi S, Monaco HL, Samo B, Bubacco L. The chaperone-like protein 14-3-3 η interacts with human α -synuclein aggregation intermediates rerouting the amyloidogenic pathway and reducing α -synuclein cellular toxicity. *Hum Mol Genet.* 2014 Nov 1;23(21):5615-29. doi:10.1093/hmg/ddu275.
- 5:** **Munari F**, Gajda MJ, Hiragami-Hamada K, Fischle W, Zweckstetter M. Characterization of the effects of phosphorylation by CK2 on the structure and binding properties of human HP1 β . *FEBS Lett.* 2014 Apr 2;588(7):1094-9. doi:10.1016/j.febslet.2014.02.019.
- 4:** Rezaei-Ghaleh N, Klama F, **Munari F**, Zweckstetter M. Predicting the rotational tumbling of dynamic multidomain proteins and supramolecular complexes. *Angew Chem Int Ed Engl.* 2013 Oct 18;52(43):11410-4. doi:10.1002/anie.201305094.
- 3:** **Munari F**, Rezaei-Ghaleh N, Xiang S, Fischle W, Zweckstetter M. Structural plasticity in human heterochromatin protein 1 β . *PLoS One.* 2013 Apr 9;8(4):e60887. doi: 10.1371/journal.pone.0060887.
- 2:** **Munari F**, Soeroes S, Zenn HM, Schomburg A, Kost N, Schröder S, Klingberg R, Rezaei-Ghaleh N, Stützer A, Gelato KA, Walla PJ, Becker S, Schwarzer D, Zimmermann B, Fischle W, Zweckstetter M. Methylation of lysine 9 in histone H3 directs alternative modes of highly dynamic interaction of heterochromatin protein hHP1 β with the nucleosome. *J Biol Chem.* 2012 Sep 28;287(40):33756-65. doi: 10.1074/jbc.M112.390849.
- 1:** Bisaglia M, Tosatto L, **Munari F**, Tessari I, de Laureto PP, Mammi S, Bubacco L. Dopamine quinones interact with alpha-synuclein to form unstructured adducts. *Biochem Biophys Res Commun.* 2010 Apr 2;394(2):424-8. doi:10.1016/j.bbrc.2010.03.044.