

## Curriculum Vitae Francesca Munari

### PERSONAL INFORMATION

Family name, first name: Munari, Francesca

Citizenship: Italian

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### CURRENT POSITION

01.07.2019- to date: RTD-A Researcher CHIM/06 (assistant professor in organic chemistry) at the Department of Biotechnology, University of Verona, Italy.

### NATIONAL SCIENTIFIC QUALIFICATION

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

### 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.

### PREVIOUS POSITIONS/ RESEARCH EXPERIENCES

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.

### GRANTS

- 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 (from 01.07.2020 for 2 years)

### FELLOWSHIPS

- 01.07.2018-30.06.2019: University of Verona, *assegno di ricerca*;

- 01.02.2017-30.06.2018: Fondazione Umberto Veronesi *fellowship 2017*; project title: "Role of polyubiquitin in the aggregation of Tau protein".

- 01.11.2016-31.01.2017: University of Verona, *assegno di ricerca*;
- 01.11.2015-31.10.2016: University of Verona, *assegno di ricerca*;
- 01.11.2014-31.10.2015: University of Verona, *borsa di ricerca*;
- 02.01.2006–31.12.2008: University of Padova, *borsa di dottorato*.

## TEACHING

- Since 2020: 60 hours/year (5 teaching credits) in Organic Chemistry (laboratory modules) on the Bachelor's degree in Biotechnology of the University of Verona.
- Since October 2020: member of the scientific board of the PhD in Nanoscience and Advanced Technologies of the University of Verona.
- 21.12.2018: lecture "Structure, dynamics, and self-assembly of amyloidogenic proteins" for the PhD course on biotechnology of the University of Verona.
- 27.06.2012: NMR practical lecture for the Marie Curie INITIAL TRAINING NETWORKS (ITN) NEURASYNC training course "Protein aggregation and structure", Max Planck Institute for Biophysical Chemistry, Göttingen, Germany.
- 12.12.2011-15.12.2011: Tutoring of Biochemistry practical course at the Universität Göttingen, Germany
- 15.12.2009-18.12.2009: Tutoring of Biochemistry practical course at the Universität Göttingen, Germany
- Mentoring of master's programs students and PhD students.

## ORGANIZATION OF CONFERENCES

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

## ORAL PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES

1. **Munari F.** Semi-synthesis of ubiquitinated proteins for structural studies. *Workshop "I CHIMICI PER LE BIOTECNOLOGIE"* Milano, Italy, 22-02-2019.
2. **Munari F.** STRUCTURAL AND MOLECULAR RECOGNITION PROPERTIES OF UBB<sup>+1</sup>, A UBIQUITIN MUTANT ASSOCIATED WITH ALZHEIMER'S DISEASE, *XLVII National Congress on Magnetic Resonance* Torino, 19-21 September 2018.
3. **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.
4. **Munari F.** Conformational plasticity of the multi-domain Heterochromatin Protein 1 $\beta$ . *9th European Biophysics Congress*. Lisbon, Portugal, 13–17 July 2013.
5. **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.
6. **Munari F.** Structural analysis of hHP1 $\beta$ -nucleosome complex in dependence of histone 3 methylation. *2nd Göttinger Chromatin Club Symposium*, Göttingen, Germany, 14 Sept 2012.
7. **Munari F.** Molecular basis of hHP1 $\beta$ /nucleosome interaction in dependence of histone 3 methylation. *8<sup>th</sup> SIBBM Seminars: Frontiers in Molecular Biology "Epigenetics in Development and Disease"*, Palermo, Italy, 24-26 May 2012.

## LIST OF PUBLICATIONS

Since 2010 F. Munari published 28 research articles (9 of them as first author) in peer-reviewed international scientific journals, including *Angewandte Chemie International Edition*, *Nature Structural Molecular Biology*, *Brain* and *The Journal of Biological Chemistry*. Up to date, she collected more than 430 total citation and h-index of 12 as reported by Scopus.

- 1: 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.

**2: 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.

**3:** 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.

**4:** 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.

**5: 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.

**6: 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.

**7:** 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.

**8:** 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.

**9:** 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  $\alpha$ -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.

**10: Munari F**, Bortot A, Assfalg M, D'Onofrio M. Alzheimer's disease-associated ubiquitin mutant Ubb<sup>+1</sup>: 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.

**11:** 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.

**12:** 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.

**13:** 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.

**14:** 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  $\alpha$ -synuclein-associated neurodegeneration in synucleinopathies. *Brain*. 2017 May 1;140(5):1399-1419. doi: 10.1093/brain/awx056.

**15: 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.

**16:** 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.

**17:** 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  $\alpha$ -Synuclein and Reduce Its Aggregation in Cells. *J Biol Chem*. 2015 Nov 13;290(46):27582-93. doi:10.1074/jbc.M114.636027.

**18:** 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.

**19:** 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).

**20:** 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.

**21:** 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.

**22:** 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.

**23:** 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 $\eta$  interacts with human  $\alpha$ -synuclein aggregation intermediates rerouting the amyloidogenic pathway and reducing  $\alpha$ -synuclein cellular toxicity. *Hum Mol Genet*. 2014 Nov 1;23(21):5615-29. doi:10.1093/hmg/ddu275.

**24: 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 $\beta$ . *FEBS Lett*. 2014 Apr 2;588(7):1094-9. doi:10.1016/j.febslet.2014.02.019.

**25:** 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.

**26: Munari F**, Rezaei-Ghaleh N, Xiang S, Fischle W, Zweckstetter M. Structural plasticity in human heterochromatin protein 1 $\beta$ . PLoS One. 2013 Apr 9;8(4):e60887. doi: 10.1371/journal.pone.0060887.

**27: 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 $\beta$  with the nucleosome. J Biol Chem. 2012 Sep 28;287(40):33756-65. doi: 10.1074/jbc.M112.390849.

**28: 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.