ALBERTO CECCON, Ph.D

Head of the Laboratory of NMR Spectroscopy
Laimburg Research Centre

PERSONAL DATA

- Lab Address: NOI Techpark, A2 Building, Via Alessandro Volta, 13A, 39100 Bolzano BZ
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- Link to publications: https://pubmed.ncbi.nlm.nih.gov/?term=ceccon+a.&sort=date&sort_order=desc

EDUCATION

- 01/01/2010 - 04/09/2013 — University of Verona, Italy
  Doctoral of Philosophy in Molecular, Industrial and Environmental Biotechnologies. PhD award date: 04/09/2013
  Supervisor: Michael Assfalg, Ph.D.
- 01/10/2007 - 18/12/2009 — University of Verona, Italy
  M.Sc. in Molecular Biotechnology (110/110 cum laude)
  Supervisor: Prof. Henriette Molinari
- 04/10/2004 - 17/07/2007 — University of Verona, Italy
  B.Sc. in Biotechnology (110/110 cum laude)
  Supervisor: Vladia Monsurrò, Ph.D

POSITIONS

- 05/15/2022 – current — Head of the Laboratory of NMR Spectroscopy
  Laimburg Research Centre/unibz
  NOI TechPark, Bolzano (BZ)
- 01/01/2020 – 05/15/2022 — Research Fellow
  National Institutes of Health (NIH), Bethesda, MD
  Supervisor: G. Marius Clore, M.D., Ph.D.
- 08/01/2015 – 31/12/2019 — Visiting Fellow
  National Institutes of Health (NIH), Bethesda, MD
  Supervisor: G. Marius Clore, M.D., Ph.D.
- 02/06/2014 – 25/07/2014 — Visiting Fellow (through Bio-NMR)
  École Normale Supérieure de Lyon
- 01/07/2013 – 31/12/2014 — Post-Doctoral Research Fellow
  University of Verona, Italy
- 01/01/2013 – 30/06/2013 — Research Fellow - Annalaura Segre fellowship
  University of Verona, Italy

RESEARCH INTEREST

My research focuses on exploring the therapeutic potential of bioactive natural compounds extracted directly from fruits, as well as from the processing by-products of the grape and apple transformation industry. Recent studies have shown that these compounds may interact with amyloidogenic proteins and prevent their misfolding and aggregation, which are linked to the development of neurodegenerative diseases such as Parkinson's, Alzheimer's, and Huntington's. Amyloid aggregation is a complex process that progresses from monomers to mature fibrils through intermediates like oligomers and protofibrils. These intermediates can disrupt cellular function, making it essential to understand both the early and late stages of aggregation. Solution NMR spectroscopy is ideal for providing atomic-level insights into these transient, low-populated species, which conventional methods cannot capture. Using NMR techniques, I have studied httex1 constructs, showing that non-pathogenic $htt^{ex1}Q_7$ undergoes rapid tetramerization to form a four-helix bundle, alongside a slower disordered dimer. Methods like CPMG and R1rho link sub-millisecond tetramerization to fibril formation, highlighting the importance of tetramer templates in nucleation. Reducing tetramer populations can block fibril formation, underscoring the link between pre-nucleation events and long-term aggregation. For pathogenic $htt^{ex1}Q_{35}$, I use ^{1}H-^{15}N SOFAST-HMQC correlation spectra to analyze pre-nucleation tetramerization and fibrillization kinetics. This approach enables me to study both fast and slow aggregation events, providing a platform for evaluating aggregation inhibitors.

My research aims to uncover the early stages of amyloid aggregation, develop rapid screening methods for anti-fibril compounds, and explore the interactions between these compounds and pathological amyloids.

SELECTED PUBLICATIONS

1. Eltemur D, Robatscher P, Oberhuber M, **Ceccon A.** Improved Detection and Quantification of Cyclopropane Fatty Acids via Homonuclear Decoupling Double Irradiation NMR Methods. **ACS Omega.** 2023 Oct 24;8(44):41835-41843. doi: 10.1021/acsomega.3c06538. eCollection 2023 Nov 7. PMID: 37970028
2. **Ceccon A.**, Tugarinov V, Torricella F, Clore GM. Quantitative NMR analysis of the kinetics of prenucleation oligomerization and aggregation of pathogenic huntingtin exon-1 protein. **Proc Natl Acad Sci U S A.** 2022 Jul 19;119(29):e2207690119. doi: 10.1073/pnas.2207690119. Epub 2022 Jul 12.PMID: 35858329
3. Tugarinov V, **Ceccon A.**, Clore GM. NMR methods for exploring 'dark' states in ligand binding and protein-protein interactions. **Prog Nucl Magn Reson Spectrosc.** 2022 Feb;128:1-24. doi: 10.1016/j.pnmrs.2021.10.001. Epub 2021 Nov 2.PMID: 35282867
4. **Ceccon A.**, Tugarinov V, Clore GM. Quantitative exchange NMR-based analysis of Huntingtin-SH3 interactions suggests an allosteric mechanism of inhibition of Huntingtin Aggregation. **J Am Chem Soc**. 2021 Jun 30;143(25):9672-9681. doi: 10.1021/jacs.1c04786. Epub 2021 Jun 17.PMID: 34137596
5. **Ceccon A.**, Tugarinov V, Clore GM. Kinetics of Fast Tetramerization of the Huntingtin Exon 1 Protein Probed by Concentration-Dependent On-Resonance $R1\rho$ Measurements. ***J Phys Chem Lett***. 2020 Jul 16;11(14):5643-5648. doi: 10.1021/acs.jpclett.0c01636. Epub 2020Jul 1.
6. **Ceccon A.,** Tugarinov V., Ghirlando R., Clore GM. Abrogation of pre-nucleation, transient oligomerization of the Huntington exon-1 protein by human profilin-I. **Proc Natl Acad Sci U S A.** 2020 Mar 17;117(11):5844-5852. doi:10.1073/pnas.1922264117. Epub 2020 Mar 3. PubMed PMID: 32127471.
7. **Ceccon A**, Tugarinov V, Clore GM. TiO_2 Nanoparticles Catalyze Oxidation of Huntingtin Exon 1 Derived Peptides Impeding Aggregation: A Quantitative NMR Study of Binding and Kinetics. **J Am Chem Soc.** 2019 Jan 9;141(1):94-97. doi:10.1021/jacs.8b11441. Epub 2018 Dec 26. PubMed PMID: 30540190; PubMed Central PMCID: PMC6475464.
8. **Ceccon A**., Schmidt T., Tugarinov V., Kotler S.A., Schwieters C.D. Clore GM Interaction of Huntingtin Exon-1 peptides with lipid-based micellar nanoparticles probed by solution NMR and Q-band pulsed EPR. J Am Chem Soc. 2018 May 23;140(20):6199-6202. doi: 10.1021/jacs.8b02619. Epub 2018 May 14. PubMed PMID: 29727175.

9. **Ceccon A.**, Tugarinov V, Bax A, Clore GM. Global Dynamics and Exchange Kinetics of a Protein on the Surface of Nanoparticles Revealed by Relaxation-Based Solution NMR Spectroscopy. ***J Am Chem Soc*.** 2016 Apr 25. May 11;138(18):5789-92. doi: 10.1021/jacs.6b02654. Epub 2016 Apr 27. PMID: 27111298.
10. **Ceccon A.,** Lelli M, D'Onofrio M, Molinari H, Assfalg M. Dynamics of a globular protein adsorbed to liposomal nanoparticles**.** ***J Am Chem Soc***. 2014 Sep 24;136(38):13158-61. doi: 10.1021/ja507310m. Epub 2014 Sep 11. PubMed PMID: 25198387.

ADDITIONAL RESEARCH ACHIEVEMENTS:

SELECTED GRANTS, ACADEMIC AND PROFESSIONAL HONORS

1. **CARITRO foundation** (Role: Lead Partner, Amount: ~ 90k, Duration: 2025 - 2026). Title of the project: *"SUSTAIN: System for the Sustainable Use of Grape Pomace for a Circular Economy and Innovative Products".*
2. **European Regional Development Fund (ERDF)** (Role: Partner, Amount: ~ 250k, Duration: 2025 -2027). Title of the project: *"MOC: MultiOmics Center for Food and Health".*
3. **European Regional Development Fund (ERDF)** (Role: Partner, Duration: 2025 -2027). Title of the project: *"PROSEED: Research on drying and fermentation technologies for the valorization of innovative protein isolates for food and agricultural purpose."*
4. **Fellows Awards for Research Excellence** (**FARE**) 2019 and 2020 competition. National Institutes of Health NIH (Bethesda, MD, USA)
5. May 2018 - **The Elena and Antonio De Luca Young Scientist Award** of the Italian Cultural Society of Washington D.C.
6. Jan 2016 - **Special mention** for the paper "*Dynamics of a Globular Protein Adsorbed to Liposomal Nanoparticles*" (Ceccon A. *JACS 2014*) from the Italian Chemical Society within the framework of the "Levi Prize 2014", January 2016.

MOST RECENT NATIONAL AND INTERNATIONAL CONFERENCES ATTENDED AS INVITED SPEAKER

7. "Unveiling the Secrets of Catechin: Insights from NMR Spectroscopy" (*invited speaker* ***VII Workshop on NMR applied to Food Chemistry,*** *Roma June 20-21, 2024*)
8. "Improved detection and quantification of cyclopropane fatty acids (CPFAs) by 1H NMR spectroscopy using a combination of homonuclear decoupling with double irradiation methods" (*invited speaker* ***GiDRM****, Roma September 6-8, 2023*)

MISCELLANOUS

9. National Scientific Qualification for the position of Associate Professor in the Competitive Sector 03/C1 – Organic Chemistry.
10. Main organizer of the "NMR Opening and Symposium", guest Prof. Kurt Wutrich (Nobel Prize Winner Chemistry 2002), (May 15-16, 2023, NOI Techpark)

Date
December 11th, 2024