

ALESSANDRA ASTEGNO

Personal details

Born in Montecchio Maggiore (VI), Italy, in 1980.

Career breaks

January 2015- June 2015: Maternity Leave

October 2020- February 2021: Maternity Leave

Education and professional appointments

- 2022-present: Associate Professor of Biochemistry, Dept of Biotechnology, University of Verona
- 2011-2022: Assistant Professor of Biochemistry, Dept of Biotechnology, University of Verona.
- 2019: Visiting researcher in Biochemistry at CIC bioGUNE Research Center (Spain).
- 2010-2011: Research fellowship in Biochemistry, University of Verona
- 2009-2010: Master degree cum laude in Agri-Food Biotechnology, University of Verona.
- 2007-2009: PhD in Applied Biotechnologies, University of Verona.
- 2005-2006: Research Fellow at the University of Verona.
- 2004: Visiting scholar, University of Manchester, UK.
- 2004: Degree (5 years) cum laude in Agro-industrial Biotechnology, University of Verona.
- 1999: High school diploma.

Awards and qualifications

- 29 September 2023: Qualification as Full Professor of Biochemistry in Italian Universities.
- 24 September 2018: Qualification as Associate Professor of Biochemistry in Italian Universities.
- 2019: Winner, International Mobility Grant, University of Verona, for research at CIC bioGUNE Research Center, Spain
- 2017: winner of an Italian FFABR ("Fondo per il Finanziamento delle Attività Base di Ricerca", Italian Law 232/2016) research fund. Amount: € 3000.

Current institutional roles

- Member of the Quality Assurance (AQ) Committee for the Master's degree program in Molecular and Medical Biotechnology, University of Verona.
- Member of the Quality Assurance (AQ) Committee for the single-cycle degree program in Pharmacy, University of Verona.
- Member of the Quality Assurance (AQ) Committee for the PhD Program in Molecular, Industrial, and Environmental Biotechnologies, University of Verona.
- Member of the Quality Assurance (AQ) Committee for Research, Department of Biotechnology, University of Verona.
- Member of the Academic Board of the PhD Program in Molecular, Industrial, and Environmental Biotechnologies, University of Verona.
- Member of the Teaching Committee for the single-cycle degree program in Pharmacy, University of Verona.
- Member of the Teaching Committee for the Master's degree program in Molecular and Medical Biotechnology, University of Verona.
- Member of the selection committee for the awarding of scholarships to foreign students for the Master's degree program in Molecular and Medical Biotechnology.
- Member of the Committee for the evaluation of applications for external teaching positions, Department of Biotechnology, University of Verona.

Current teaching activities in degree programs at the University of Verona

- Lecturer for the course in Biochemistry (BIO/10) in the single-cycle degree program in Pharmacy (9 CFU, 72 hours).
- Lecturer for the course in Nutritional Biochemistry (BIO/10) in the degree program in Innovation and Sustainability in Industrial Food Production (4 CFU, 32 hours).
- Lecturer for the course in Enzymology in Medical Biotechnology (BIO/10) in the Master's degree program in Molecular and Medical Biotechnology (6 CFU, 48 hours).
- Erasmus Coordinator for exchange programs in biochemistry with the University of Oldenburg (Germany) and the University of Castilla-La Mancha (Spain) for the Bachelor's degree program in Biotechnology (L2) and the Master's degree program in Molecular and Medical Biotechnology (LM9), Department of Biotechnology, University of Verona.

Supervision Activities

- Supervisor of over 40 experimental theses for the Bachelor's Degree in Biotechnology (L2) and the Master's Degree in Molecular and Medical Biotechnology (LM9), University of Verona.
- Supervisor of 2 PhD students and co-supervisor of 4 PhD students (BIO/10) at the University of Verona.
- Supervisor of more than 10 Research Fellows and Postdoctoral Researchers (BIO/10), University of Verona.

Scientific interests

My scientific career has been primarily dedicated to elucidating the structure-function relationships of proteins from both eukaryotic and bacterial systems. This research has employed a multidisciplinary approach, integrating biochemical, biophysical, and structural methodologies.

The main research lines I have focused on include:

1. **Enzymes involved in H₂S biogenesis.**
2. **Calcium sensors** (calmodulin and centrin) in plants and human pathogens.
3. **Cyclophilins from pathogens** and their interactions with immune and non-immune suppressive ligands.

Funded Projects

- 2022: Project PRIN2022 entitled 'Hydrogen sulfide metabolism in *Pseudomonas aeruginosa* (patho)physiology'. Local project coordinator.
- 2019: Research grant JOINT PROJECT19, University of Verona (role: Co-PI) € 22,800. *Exploring the natural biodiversity of C–S lyase enzymes in lactic acid bacteria for food and food-related applications.*
- 2019: research contract Oenobrand (role: PI) € 2000. *Production of the recombinant enzyme C–S lyase from *Lactobacillus delbrueckii* subsp. *Bulgaricus**
- 2019: CooperInt grant (funding for international academic mobility, € 1500). *Structure-function-activity studies on *Toxoplasma gondii* transsulfuration enzymes.* CIC bioGUNE Research Center (Derio, Spain).
- 2019: Research grant JOINT PROJECT, University of Verona (role: PI) € 39600. *Green Fluorescent Protein-based Biosensor for Multiplexed Detection of Heavy Metals in Natural Waters.*
- 2018 Project PRIN2017 entitled 'Regulatory signals and redox systems in plant growth-defence trade off'. Local project coordinator, € 136,294.
- 2017-2020: Project "3S-4H-Safe, Smart, Sustainable food for Health". € 231,000. (role: Participant)
- 2016: Research grant JOINT PROJECT (role: PI) Engineering a fusion enzyme for determination of bioactive amines". € 45,750.
- 2016: Research grant JOINT PROJECT, University of Verona (role: Participant) € 46000. *Improving wine aroma complexity by directed evolution of non-Saccharomyces yeast enzymes.*
- 2014: Research grant JOINT PROJECT, University of Verona (role: Participant) € 42125. *Engineering volatile thiol release for improved wine aroma: Directed evolution of yeast cystathionine beta-lyase.*

Invited lectures/seminars and organization of meetings (last five years)

- 2024: invited seminar. "The Large Repertoire of Calmodulin-related Proteins in Plants and Parasites". 17th International Meeting of the European Calcium Society, Cambridge. 1st – 4th September 2024
- 2023: invited seminar. "Targeting H₂S-producing enzymes as an antimicrobial strategy". Manchester Institute of Biotechnology, Manchester. 27 September 2023
- 2022: Minicourse "Enzyme therapy: Current challenges and future perspectives", PhD Program in Biotechnology, University of Verona.
- 2022: Chair of the session "Decoding Calcium Signals: Sensors and Effectors", Plant Calcium Signaling Conference (PCS 2022), Milano (Italy), July 11th – 13th
- 2021: Invited seminar. 61mo Congress of Italian Society of Biochemistry and Molecular Biology (online conference). September 23-24.
- 2018: Organizer of the workshop "Protein structure-function relationship: new challenges and advancements". October 19th, Verona.
- 2018: Organizer of the National Symposium "Proteine 2018", May 28-30, Verona.
- 2018: Organizer of the Winter School in Applied Bioinformatics, January 21-25, Alba di Canazei (TN).
- 2018: Invited seminar. Meeting Proteine 2018 (SIB, gruppo Proteine), May 28-30, Verona.
- 2018: Invited seminar. PhD in Biochemistry, Università degli Studi di Roma "La Sapienza", March, 16.
- 2018: Invited seminar. 3th International Conference on Enzymology and Molecular Biology, London (UK).
- 2018: Invited seminar. Department of Biosciences, University of Milan, February 15.
- 2017: Invited seminar. 9th International Conference on Structural Biology, Zurich (Switzerland).

Memberships:

- 2017-present: Member of the Italian Society of Biochemistry and Molecular Biology (SIB)
- 2016-present: Member of the European Calcium Society (ECS)
- Referee for a number of international journals of the Biochemistry, Molecular and Structural Biology, and Biotechnology field. I'm member of the Editorial Board of Protein Biochemistry for Basic and Applied Sciences within the journal Frontiers in Molecular Biosciences.

Citation metrics and publications

The scientific activity of Prof Astegno is documented by 50 peer-reviewed papers.

- GOOGLE SCHOLAR, h-index=21; i10-index 32, citations 1379 (spet 2025)
https://scholar.google.it/citations?hl=it&user=1KWW_hoAAAAJ
- ORCID iD: 0000-0002-7341-0970
- <https://pubmed.ncbi.nlm.nih.gov/?term=ALESSANDRA%20ASTEGNO>

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1. Clérat L, Conter C, **Astegno A**, Schneider R, Cavelier F, Vivès E. Exploring Carbon-Sulfur (CS) Lyase Enzymes across Microbial Diversity for Enhanced Thiol Release in Beer and Wine. J Agric Food Chem. 2025 Sep 8. doi:10.1021/acs.jafc.5c07932.
2. Li Z, Kim HJ, Luoni L, Conter C, Masè N, Resentini F, Xie P, **Astegno A***, Bonza MC, Hua J. Evolutionarily conserved BON1 regulates the basal cytosolic Ca²⁺ level by calmodulin-independent activation of Ca²⁺ pumps in Arabidopsis. Proc Natl Acad Sci U S A. 2025 Jun 10;122(23):e2504457122. doi: 10.1073/pnas.2504457122.
3. Conter C, Núñez-Franco R, Al-Sadeq DW, Fernández-Rodríguez C, Goikoetxea-Usandizaga N, Nasrallah GK, Nomikos M, Martínez-Chantar ML, **Astegno A**, Jiménez-Osés G, Martínez-Cruz LA. The disease-linked R336C mutation in cystathionine β -synthase disrupts communication with the PLP cofactor, yet maintains the enzyme's overall structural integrity. FEBS J. 2025 May 6. doi: 10.1111/febs.70116.
4. Favretto F, Jiménez-Faraco E, Catucci G, Di Matteo A, Travaglini-Allocatelli C, Sadeghi SJ, Dominici P, Hermoso JA, **Astegno A***. Evaluating the potential of non-immunosuppressive cyclosporin analogs for targeting Toxoplasma gondii cyclophilin: Insights from structural studies. Protein Sci. 2024 Oct;33(10):e5157.
5. Pedretti M, Fernández-Rodríguez C, Conter C, Oyenarte I, Favretto F, di Matteo A, Dominici P, Petrosino M, Martínez-Chantar ML, Majtan T, **Astegno A***, Martínez-Cruz LA. Catalytic specificity and crystal structure of cystathionine γ -lyase from Pseudomonas aeruginosa. Sci Rep. 2024 Apr 23;14(1):9364.
6. Al-Sadeq D, Conter C, Thanassoulas A, Al-Dewik N, Safieh-Garabedian B, Luis Alfonso Martínez-Cruz LA, Nasrallah G, **Astegno A***, Nomikos M. Biochemical and structural impact of two novel missense mutations in cystathionine beta-synthase gene associated with homocystinuria. Biochem J. 2024 Apr 2:BCJ20240012.
7. Caruso L, Mellini M, Catalano Gonzaga O, **Astegno A**, Forte E, Di Matteo A, Giuffrè A, Visca P, Imperi F, Leoni L, Rampioni G. Hydrogen sulfide production does not affect antibiotic resistance in Pseudomonas aeruginosa. Antimicrob Agents Chemother. 2024 Apr 3;68(4):e0007524.
8. Catalano F, Santorelli D, **Astegno A**, Favretto F, D'Abramo M, Del Giudice A, De Sciscio ML, Troilo F, Giardina G, Di Matteo A, Travaglini-Allocatelli C. Conformational and dynamic properties of the KH1 domain of FMRP and its fragile X syndrome linked G266E variant. Biochim Biophys Acta Proteins Proteom. 2024 Apr 17;1872(4):141019.
9. Pedretti M, Favretto F, Troilo F, Giovannoni M, Conter C, Mattei B, Dominici P, Travaglini-Allocatelli C, Di Matteo A, **Astegno A**. Role of myristoylation in modulating PCaP1 interaction with calmodulin. Plant Physiol Biochem. 2023 Oct;203:108003. doi: 10.1016/j.plaphy.2023.108003.
10. Conter C, Favretto F, Dominici P, Martínez-Cruz LA, **Astegno A***. Key substrate recognition residues in the active site of cystathionine beta-synthase from Toxoplasma gondii. Proteins. 2023 Oct;91(10):1383-1393.
11. Fernández-Rodríguez C, Conter C, Oyenarte I, Favretto F, Quintana I, Martínez-Chantar ML, **Astegno A***, Martínez-Cruz LA. Structural basis of the inhibition of cystathionine γ -lyase from Toxoplasma gondii by propargylglycine and cysteine. Protein Sci. 2023 Apr;32(4):e4619.
12. Favretto F, Jiménez-Faraco E, Conter C, Dominici P, Hermoso JA, **Astegno A***. Structural Basis for Cyclosporin Isoform-Specific Inhibition of Cyclophilins from Toxoplasma gondii. ACS Infect Dis. 2023 Feb 10;9(2):365-377.

13. Bombardi L, Favretto F, Pedretti M, Conter C, Dominici P, **Astegno A***. Conformational Plasticity of Centrin 1 from *Toxoplasma gondii* in Binding to the Centrosomal Protein SFI1. *Biomolecules*. 2022 Aug 13;12(8):1115.
14. Conter C, Fruncillo S, Favretto F, Fernández-Rodríguez C, Dominici P, Martínez-Cruz LA, **Astegno A***. Insights into Domain Organization and Regulatory Mechanism of Cystathionine Beta-Synthase from *Toxoplasma gondii*. *Int J Mol Sci*. 2022 Jul 25;23(15):8169.
15. Troilo F, Pedretti M, Travaglini-Allocatelli C, **Astegno A***, Di Matteo A. Rapid kinetics of calcium dissociation from plant calmodulin and calmodulin-like proteins and effect of target peptides. *Biochem Biophys Res Commun*. 2022 Jan 29;590:103-108.
16. Pedretti M, Bombardi L, Conter C, Favretto F, Dominici P, **Astegno A***. Structural Basis for the Functional Diversity of Centrin: A Focus on Calcium Sensing Properties and Target Recognition. *Int J Mol Sci*. 2021 Nov 10;22(22):12173.
17. Fernández-Rodríguez C, Oyenarte I, Conter C, González-Recio I, Núñez-Franco R, Gil-Pitarch C, Quintana I, Jiménez-Osés G, Dominici P, Martínez-Chantar ML, **Astegno A***, Martínez-Cruz LA. Structural insight into the unique conformation of cystathionine β -synthase from *Toxoplasma gondii*. *Comput Struct Biotechnol J*. 2021 Jun 6;19:3542-3555.
18. Conter C, Bombardi L, Pedretti M, Favretto F, Di Matteo A, Dominici P, **Astegno A***. The interplay of self-assembly and target binding in centrin 1 from *Toxoplasma gondii*. *Biochem J*. 2021 Jul 16;478(13):2571-2587.
19. **Astegno A**, Conter C, Bertoldi M, Dominici P. Structural Insights into the Heme Pocket and Oligomeric State of Non-Symbiotic Hemoglobins from *Arabidopsis thaliana*. *Biomolecules*. 2020 Nov 29;10(12):1615.
20. Conter C, Fruncillo S, Fernández-Rodríguez C, Martínez-Cruz LA, Dominici P, **Astegno A***. Cystathionine β -synthase is involved in cysteine biosynthesis and H₂S generation in *Toxoplasma gondii*. *Sci Rep*. 2020 Sep 4;10(1):14657.
21. Bombardi L, Pedretti M, Conter C, Dominici P, **Astegno A***. Distinct Calcium Binding and Structural Properties of Two Centrin Isoforms from *Toxoplasma gondii*. *Biomolecules*. 2020 Aug 4;10(8):1142.
22. Pedretti M, Conter C, Dominici P, **Astegno A***. SAC3B is a target of CML19, the centrin 2 of *Arabidopsis thaliana*. *Biochem J*. 2020 Jan 17;477(1):173-189.
23. Fruncillo S, Trande M, Blanford CF, **Astegno A**, Wong LS. A Method for Metal/Protein Stoichiometry Determination Using Thin-Film Energy Dispersive X-ray Fluorescence Spectroscopy. *Anal Chem*. 2019 Sep 17;91(18):11502-11506.
24. Trande M, Pedretti M, Bonza MC, Di Matteo A, D'Onofrio M, Dominici P, **Astegno A***. Cation and peptide binding properties of CML7, a calmodulin-like protein from *Arabidopsis thaliana*. *J Inorg Biochem*. 2019 Oct;199:110796.
25. Maresi E, Janson G, Fruncillo S, Paiardini A, Vallone R, Dominici P, **Astegno A***. Functional Characterization and Structure-Guided Mutational Analysis of the Transsulfuration Enzyme Cystathionine γ -Lyase from *Toxoplasma gondii*. *Int J Mol Sci*. 2018 Jul 20;19(7):2111.
26. Vandelle E, Vannozzi A, Wong D, Danzi D, Digby AM, Dal Santo S, **Astegno A**. Identification, characterization, and expression analysis of calmodulin and calmodulin-like genes in grapevine (*Vitis vinifera*) reveal likely roles in stress responses. *Plant Physiol Biochem*. 2018 Aug;129:221-237.
27. La Verde V, Dominici P, **Astegno A***. Towards Understanding Plant Calcium Signaling through Calmodulin-Like Proteins: A Biochemical and Structural Perspective. *Int J Mol Sci*. 2018 Apr 30;19(5):1331.
28. Rossignoli G, Phillips RS, **Astegno A**, Menegazzi M, Voltattorni CB, Bertoldi M. Phosphorylation of pyridoxal 5'-phosphate enzymes: an intriguing and neglected topic. *Amino Acids*. 2018 Feb;50(2):205-215.
29. La Verde V, Trande M, D'Onofrio M, Dominici P, **Astegno A***. Binding of calcium and target peptide to calmodulin-like protein CML19, the centrin 2 of *Arabidopsis thaliana*. *Int J Biol Macromol*. 2018 Mar;108:1289-1299.
30. **Astegno A***, Bonza MC, Vallone R, La Verde V, D'Onofrio M, Luoni L, Molesini B, Dominici P. *Arabidopsis* calmodulin-like protein CML36 is a calcium sensor that interacts with the plasma membrane Ca²⁺-ATPase isoform ACA8 and stimulates its activity. *J Biol Chem*. 2017 Sep 8;292(36):15049-15061.
31. La Verde V, Dominici P, **Astegno A***. Determination of Hydrodynamic Radius of Proteins by Size Exclusion Chromatography. *Bio Protoc*. 2017 Apr 20;7(8):e2230.
32. **Astegno A**, Maresi E, Bertoldi M, La Verde V, Paiardini A, Dominici P. Unique substrate specificity of ornithine aminotransferase from *Toxoplasma gondii*. *Biochem J*. 2017 Mar 7;474(6):939-955.
33. Allegrini A, **Astegno A**, La Verde V, Dominici P. Characterization of C-S lyase from *Lactobacillus delbrueckii* subsp. *bulgaricus* ATCC BAA-365 and its potential role in food flavour applications. *J Biochem*. 2017 Apr 1;161(4):349-360.
34. Kumar N, **Astegno A**, Chen J, Giorgetti A, Dominici P. Residues in the Distal Heme Pocket of *Arabidopsis* Non-Symbiotic Hemoglobins: Implication for Nitrite Reductase Activity. *Int J Mol Sci*. 2016 Apr 28;17(5):640.

35. Vallone R, La Verde V, D'Onofrio M, Giorgetti A, Dominici P, **Astegno A**. Metal binding affinity and structural properties of calmodulin-like protein 14 from *Arabidopsis thaliana*. *Protein Sci.* 2016 Aug;25(8):1461-71.
36. **Astegno A**, La Verde V, Marino V, Dell'Orco D, Dominici P. Biochemical and biophysical characterization of a plant calmodulin: Role of the N- and C-lobes in calcium binding, conformational change, and target interaction. *Biochim Biophys Acta.* 2016 Mar;1864(3):297-307.
37. **Astegno A**, Capitani G, Dominici P. Functional roles of the hexamer organization of plant glutamate decarboxylase. *Biochim Biophys Acta.* 2015 Sep;1854(9):1229-37.
38. **Astegno A**, Maresi E, Marino V, Dominici P, Pedroni M, Piccinelli F, Dell'Orco D. Structural plasticity of calmodulin on the surface of CaF₂ nanoparticles preserves its biological function. *Nanoscale.* 2014 Dec 21;6(24):15037-47.
39. **Astegno A**, Allegrini A, Piccoli S, Giorgetti A, Dominici P. Role of active- site residues Tyr55 and Tyr114 in catalysis and substrate specificity of *Corynebacterium diphtheriae* C-S lyase. *Proteins.* 2015 Jan;83(1):78-90.
40. Cellini B, Montioli R, Oppici E, **Astegno A**, Voltattorni CB. The chaperone role of the pyridoxal 5'-phosphate and its implications for rare diseases involving B6-dependent enzymes. *Clin Biochem.* 2014 Feb;47(3):158-65.
41. Marino V, **Astegno A**, Pedroni M, Piccinelli F, Dell'Orco D. Nanodevice-induced conformational and functional changes in a prototypical calcium sensor protein. *Nanoscale.* 2014 Jan 7;6(1):412-23.
42. **Astegno A**, Giorgetti A, Allegrini A, Cellini B, Dominici P. Characterization of C-S Lyase from *C. diphtheriae*: a possible target for new antimicrobial drugs. *Biomed Res Int.* 2013;2013:701536.
43. Abbruzzetti S, Faggiano S, Spyraakis F, Bruno S, Mozzarelli A, **Astegno A**, Dominici P, Viappiani C. Oxygen and nitric oxide rebinding kinetics in nonsymbiotic hemoglobin AHb1 from *Arabidopsis thaliana*. *IUBMB Life.* 2011 Dec;63(12):1094-100.
44. Spyraakis F, Faggiano S, Abbruzzetti S, Dominici P, Cacciatori E, **Astegno A**, Droghetti E, Feis A, Smulevich G, Bruno S, Mozzarelli A, Cozzini P, Viappiani C, Bidon-Chanal A, Luque FJ. Histidine E7 dynamics modulates ligand exchange between distal pocket and solvent in AHb1 from *Arabidopsis thaliana*. *J Phys Chem B.* 2011 Apr 14;115(14):4138-46.
45. Nienhaus K, Dominici P, **Astegno A**, Abbruzzetti S, Viappiani C, Nienhaus GU. Ligand migration and binding in nonsymbiotic hemoglobins of *Arabidopsis thaliana*. *Biochemistry.* 2010 Sep 7;49(35):7448-58.
46. Faggiano S, Abbruzzetti S, Spyraakis F, Grandi E, Viappiani C, Bruno S, Mozzarelli A, Cozzini P, **Astegno A**, Dominici P, Brogioni S, Feis A, Smulevich G, Carrillo O, Schmidtke P, Bidon-Chanal A, Luque FJ. Structural plasticity and functional implications of internal cavities in distal mutants of type 1 non- symbiotic hemoglobin AHb1 from *Arabidopsis thaliana*. *J Phys Chem B.* 2009 Dec 10;113(49):16028-38.
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Protein Data Bank submissions:

ID	TITLE	RELEASE DATE
6Y21	Crystal structure of delta466-491 cystathionine beta-synthase from <i>Toxoplasma gondii</i> with L-Cystathionine	2021-02-24
6XYL	Crystal structure of delta466-491 cystathionine beta-synthase from <i>Toxoplasma gondii</i> with L-serine	2021-02-10
6Z3S	Crystal structure of delta466-491 cystathionine beta-synthase from <i>Toxoplasma gondii</i> with O-Acetylserine	2021-06-02
6ZS7	Crystal structure of delta466-491 cystathionine beta-synthase from <i>Toxoplasma gondii</i> with L-cysteine	2021-07-28
7BA4	Structure of Cystathionine gamma-lyase from <i>Pseudomonas aeruginosa</i>	2021-09-29
6XWL	Cystathionine beta-synthase from <i>Toxoplasma gondii</i>	2021-02-03

8B58	Crystal Structure of Cyclophilin TgCyp23 from <i>Toxoplasma gondii</i> in complex with Cyclosporin A	2023-02-01
3HBX	Crystal structure of GAD1 from <i>Arabidopsis thaliana</i>	2009-07-28
7NL1	Crystal structure of cystathionine gamma-lyase from <i>Toxoplasma gondii</i>	2022-03-02