

BIOGRAPHICAL SKETCH

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NAME: Federico Forneris

POSITION TITLE: Professor of Molecular Biology

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Università degli Studi di Torino	M.S.	11/12/2002	Physical Chemistry (5 years); final grade: 110/110 summa cum laude with special mention and recommendation for publication
Università degli Studi di Pavia / IUSS	PhD	01/02/2007	Basic and Applied Bio-Molecular Sciences

A. Personal Statement

My research group has been active since 2014 and is currently composed of twelve young researchers and numerous undergraduates. Our major research interest is the elucidation of the intricate mechanisms of protein-protein interaction and signalling. We focus on extracellular macromolecules involved in fundamental biological processes of bio-medical relevance. We merge computational and experimental structural biology with biochemistry and biophysics to characterize large macromolecular complexes and elucidate their structure-function relationship to put the molecular insights in the proper biological context. We secured a strong reputation in the fields of recombinant protein production (using human cells) and in the development of methods for in vitro protein characterization. I started my independent research group at the University of Pavia thanks to the Armenise-Harvard Career Development Award and the Rita Levi-Montalcini Award. For more information about current research and targets, please visit the "Research" section of my lab website: <http://fornerislab.unipv.it/>. I have co-authored more than 80 scientific publications (H-index 36, Google Scholar, 2025). Since 2014, I have secured >3.5 M€ in grants and awards from international public and private institutions (>1 grant per year as principal investigator since 2014, plus numerous collaborative grants).

B. Positions, Scientific Appointments, and Honors**Current Positions and Scientific Appointments**

- Since 2023: Full Professor of Molecular Biology, University of Pavia with dual affiliation at IRCCS Policlinico San Matteo.

- Since 2022: President of the INF-ACT Foundation, Pavia, coordinating a 114.5 M€ project involving >800 researchers working in 70 institutions in Italy (<http://www.inf-act.it>).
- Since 2025: President of Centro Grandi Strumenti, University of Pavia (<https://cgs.unipv.it>), a platform offering high-tech infrastructures for STEM and life science research.
- Since 2022: Coordinator of the Biochemical and Biotechnological Sciences PhD Program at IUSS Pavia.

Previous Positions and Scientific Appointments

- 2021-2025: Vice-Rector for Research, University of Pavia.
- 2017-2023. Associate Professor of Molecular Biology (tenured position).
- 2014-2017- Rita Levi-Montalcini Award for young researchers: 3-year appointment as Assistant Professor (tenure-track, resigned from previously awarded appointment) in Italy and financial support for conferences and publications (200'000 EUR).
- 2014-2017- 3-year appointment as Assistant Professor (tenure-track) at the University of Pavia, Italy, kept only for 7 months due to Rita Levi-Montalcini Award.
- 2009-2013- Postdoctoral fellowship at Utrecht University, The Netherlands, (5 years), focusing on structural and molecular studies in the field of complement immune response.
- 2007-2008- postdoctoral fellowship at the University of Pavia, Italy (2 years), focusing on structural and molecular biology of cancer-related drug targets.

Honors and Awards

- Since 2014: 12 competitive research grants successfully awarded as PI, 9 as Co-I, >10 research contracts with private companies.
- 2021 – Silver Medal of Merit, Orders of Saints Maurice and Lazarus for COVID-19 research.
- 2017 – Invited Honorary Lecture for the Inauguration of the Academic Year of the University of Pavia (highest University honor): “Watching Life – One Molecule at a Time” (<https://t.co/BGhwdjT5h7>)
- 2015-2018 – Rita Levi-Montalcini Award (grant + tenure track position, success rate <2%)
- 2014-2019 – Armenise-Harvard Career Development Award (USD 1 million, success rate <5%)
- 2010 – Best oral presentation at the 7th Innate Immunity Conference, Rhodes, Greece
- 2003-2006 – 3-years PhD fellowship from the University of Pavia and the Institute of Superior Studies (IUSS Pavia).

Main Ongoing Research Support

- 2026-2031 - Investigator grant (as Principal Investigator, EUR 698'000), funded by AIRC, for the characterization of enzyme complexes responsible for collagen lysine modifications and implications in cancer metastasis.
- 2026-2028 – “ARTIBAC” project (as co-Investigator, EUR 270'000), funded by Regione Lombardia, for the AI-assisted design and characterization of immunotherapy strategies against *K. pneumoniae* and *S. aureus*.
- 2023-2026 – Rarer Types Disease Grant (as Principal Investigator, EUR 120'000), funded by the Ehlers-Danlos Society, for molecular characterizations of pathogenic PLOD1 mutations causing Ehlers-Danlos syndrome.
- 2022-2027 – “IMMUNO-HUB” project (as co-Investigator, EUR 190'000), funded by the Italian Ministry of Health, for the development of novel immunotherapy strategies against SARS-CoV-2.

C. Contributions to Science

- 1) Large-scale recombinant protein production: thanks to our advanced protein production strategies, we contributed to numerous projects providing essential reagents difficult/impossible to obtain elsewhere.
- 2) Understanding the molecular mechanisms of collagen homeostasis: through integrative structural and biochemical studies we established a structural framework to understand the molecular mechanisms of collagen lysine post-translational modifications and to rationalize the impact of the disease-related mutations affecting genes encoding for collagen biosynthesis enzymes.
- 3) Elucidating molecular recognition at synapses: focusing on neuromuscular junctions, and recently also expanding to retinal synapses, we aim at understanding the architectures and functions of specific ligands, receptors and regulator molecules.
- 4) Molecular characterization of insect signaling proteins: using an integrative structural biology approach, my group identified an unprecedented mechanism triggered by a mosquito salivary protein that alters labrum shape, enhance salivation, and drive probing movements to promote efficient blood feeding. This work gave the spark to more extensive research focusing on mosquito proteins involved in unusual signaling cascades, including vitellogenin and its receptor.
- 5) Structural studies on amplification and regulation of complement immune responses: I combined low-resolution x-ray crystallography of large macromolecular complexes, biochemistry and biophysics to characterize multiple intermediate steps of the complement cascade, collecting important results that enabled a better understanding of complement amplification and regulation, paving the way to drug discovery and development.
- 6) Biochemical and structural studies of histone demethylases: I contributed to the discovery and biochemical characterization of histone lysine demethylase LSD1, paving the way for development of several covalent and non-covalent LSD1 inhibitors currently in advanced state of clinical trial testing.

D. Relevant publications

A) Associated to Contribution 1:

- [A1] Forneris F., et al. (2017) Acta Cryst A <https://doi.org/10.1107/S2053273317082985>
This conference abstract describes our strategies for large-scale recombinant protein production.
- [A2] Faravelli S., et al. (2021) Bio-protocol <https://doi.org/10.21769/BioProtoc.3998>
This publication summarizes our efforts to optimize reliable recombinant protein production pipelines using HEK293 cells.
- [A3] Banushi B., et al. (2016) Nat Commun <https://doi.org/10.1038/ncomms12111>
Our recombinant samples led to revision of paradigms in collagen homeostasis and vesicular trafficking.
- [A4] Angiolini, F., et al. (2019) eLife <https://doi.org/10.7554/eLife.44305>
In this work we used our HEK293 cells expression system to produce milligram amounts of L1Cam for a large collaborative study.

B) Associated to Contribution 2:

- [B1] Scietti L., et al. (2018) Nat Commun <https://doi.org/10.1038/s41467-018-05631-5>
Through an integrative approach, we characterize the structure and functions of human LH3, a milestone for collagen research.
- [B2] Scietti, L., et al. (2019) J Bone Min Res <https://doi.org/10.1002/jbmr.3692>

SiMPLOD is our first tool designed to facilitate communication between fundamental researchers and clinical investigators.

- [B3] Koenig S.N., et al. (2021) *Traslat Res* <https://doi.org/10.1016/j.trsl.2021.08.002>
This work is an example of a genotype-to-molecular phenotype characterization of pathogenic mutations using a panel of biochemical and biophysical methods.
- [B4] De Marco M., et al., (2025) *Nat Commun* <https://doi.org/10.1038/s41467-025-59017-5>
Through an integrative approach, we characterize the structure and functions of human GLT25D1, providing a new milestone for collagen research.

C) Associated to Contribution 3:

- [C1] Guarino, S.R., et al. (2020) *Front Mol Biosci* <https://doi.org/10.3389/fmolb.2019.00156>
This review summarizes our molecular understanding about neuromuscular junctions.
- [C2] Canciani, A., et al. (2019) *Prot Sci* <https://doi.org/10.1002/pro.3587>
- [C3] Canciani, A., et al. (2022) *Mol Neurobiol* <https://doi.org/10.1007/s12035-022-03056-2>
The two publications (C2 and C3) testify our ability to infer biologically-relevant insights from human protein targets.
- [C4] Patil D.N., et al. (2023) *Sci Signal* <https://doi.org/10.1126/scisignal.add9539>
A multi-disciplinary structural characterization of a large macromolecular assembly involving an orphan receptor and a proteoglycan.

D) Associated to Contribution 4:

- [D1] Arnoldi I., et al. (2022) *Current Biology* <https://doi.org/10.1016/j.cub.2022.06.049>
This publication reports on the discovery and characterization of Aedes albopictus LIPS salivary protein as a signaling molecule that, through interaction with the mosquito labrum, induces morphological changes that enable blood feeding.
- [D2] Arnoldi I., et al. (2023) *World Allergy Organization Journal* <http://doi.org/10.1016/j.waojou.2023.100836>
In this work, we investigated the impact of Aedes albopictus LIPS salivary protein on the human host immune system.
- [D3] Dipaola M.G., et al. (2025) *Parasites and Vectors* <https://doi.org/10.1186/s13071-025-07118-x>
In this work, we investigated the impact of Aedes albopictus Ag5-3 salivary protein on the human host immune system.

E) Associated to Contribution 5:

- [E1] Forneris F., et al. (2010) *Science* <https://doi.org/10.1126/science.1195821>
This publication describes the two macromolecular complexes involved in amplification of the complement immune response.
- [E2] Hadders M.A., et al. (2012) *Cell Reports* <https://doi.org/10.1016/j.celrep.2012.02.003>
We pioneered integration of EM and crystallography to investigate a transient complement cascade intermediate.
- [E3] Forneris F., et al. (2016) *EMBO J* <https://doi.org/10.15252/embj.201593673>
Our characterization of multiple complement regulator structures highlights our commitment towards accurate and systematic understanding of structure-function relationships in bio-medically relevant human proteins and their implications in disease.
- [E4] Xue X., et al. (2017) *Nat Struct Mol Biol* <http://dx.doi.org/10.1038/nsmb.3427>
This paper illustrates the architecture of a long-sought complement complex regulatory complex and its mechanism of action.

F) Associated to Contribution 6:

- [F1] Forneris F., et al. (2005) FEBS Lett <https://doi.org/10.1016/j.febslet.2005.03.015>
This publication reports on the discovery of LSD1 as a flavin-dependent histone demethylase.
- [F2] Forneris F., et al. (2005) J Biol Chem <https://doi.org/10.1074/jbc.M509549200>
- [F3] Forneris F., et al. (2006) J Biol Chem <https://doi.org/10.1074/jbc.M607411200>
These publications (F2 and F3) describe the first biochemical characterization of LSD1 and its ability to read histone code modifications.
- [F4] Forneris F., et al. (2007) J Biol Chem <https://doi.org/10.1074/jbc.C700100200>
This publication reports on the first the first crystal structure of LSD1 in complex with a (non cross-linked) peptide substrate.
- [F5] Binda C., et al. (2010) J Am Chem Soc <https://doi.org/10.1021/ja101557k>
This publication reports on the characterization of the first ever series of covalent LSD1 inhibitors. This work paved the way for development of several covalent and non-covalent LSD1 inhibitors currently in advanced state of clinical trial testing (phase II-III) for the treatment of hematological and/or solid cancers.