

Prof. Giovanna Lippe, Department of Medicine, University of Udine, Piazzale Kolbe, I-33100 Udine, Italy

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Place and date of birth: Padova (Italy), July 15, 1957

Citizenship Italian

Marital Status Married, two sons

**Degreee**: in Biological Sciences, University of Padova, Italy, (1981) cum laude

**Positions**:

1982State exam to become licensed Biologist (National Board), University of Padova, Italy

1984-1988 PhD student in “Molecular and Cellular Biology and Pathology” at the University of Padova

1986 EMBO short term fellow, University of Oxford, UK

1988 PhD degree presenting a thesis untitled “Regulatory mechanisms of mitochondrial ATPsynthase”.

1990 Researcher of Biochemistry, University of Udine, Department of Biomedical Sciences and Technologies

2001 Associate Professor of Biochemistry, University of Udine, Department of Biomedical Sciences and Technologies

2008-present Associate Professor of Biochemistry, University of Udine, Department of Agricultural, Food, Environmental and Animal Sciences

July, 2020 National Scientific Qualification to function as Full Professor in Biochemistry (MIUR competition sector 05/E1 - General Biochemistry)

April, 2021 Associate Professor of Biochemistry, University of Udine, Department of Medicine

**Scientific interests**

Her research mainly concerned the modulation of the mitochondrial F-ATP synthase complex under patho- physiological conditions in cellular and animal models.

In the first years of her career, a key topic has been the regulatory function of the natural inhibitor IF1 that binds to the catalytic F1 sector of F-ATP synthase. She defined the kinetic properties and the main modulators of IF1 binding to the mammalian complex by using a labelled IF1. By using in *in vitro* and *in vivo* experimental models she demonstrated the essential role of IF1 in the F-ATP synthase regulation under stress conditions. She focused her attention on other factors that can primarily affect the supramolecular organization of F-ATP synthase thus impacting the catalytic properties, highlighting a master role of subunit e of the FO sector. Another topic of her research concerns the study of mechanisms underlying the oxidative inactivation of F-ATP synthase. She demonstrated that the enzyme inactivation can be mediated by Fe ions bound to the catalytic F1 sector through site-directed generation of highly reactive oxygen species.

In the last years her experience in F-ATP synthase has enabled her to actively participate to the seminal discovery that this enzyme complex forms the permeability transition pore (PTP) under conditions of high matrix Ca2+ and oxidative stress. PTP is a conserved high-conductance channel located in the inner mitochondrial membrane whose long-lasting opening may represent a point of no return in cell commitment to death. An essential step for its identification was her finding that the mitochondrial matrix protein Cyclophilin D, a well-known PTP inducer, interacts with the OSCP subunit of F-ATP synthase, which is located on top of the catalytic F1 sector, ensuring the structural and functional coupling between FO and F1. Direct evidence that PTP forms from F-ATP synthase was then obtained by electrophysiology studies, which demonstrated that the complex from mitochondria of mammals, Drosophila and yeast incorporated in planar bilayers triggered oxidant- and Ca2+-dependent currents with features indistinguishable from those of the PTP. Further evidence that the PTP originates from F-ATP synthase has been obtained through genetic manipulation of the enzyme by deletion or site-directed mutagenesis that enabled to propose a mechanicistic model of the PTP formation from ATP synthase.

She has been also involved in the identification of marker proteins in food quality by proteomic approaches and in studies on the bio-accessibility of bioactive compounds.

She is a member of the “Italian Society of Biochemistry and Molecular Biology - SIBB” and of the “Italian Society of Biomembranes and Bioenergetics - GIBB”. From 2005 to 2009 and from 2014 to 2019 she participated to the GIBB Executive Committee and to the Scientific Committees that organized the GIBB Annual meetings. During those years she was the society executive secretary.

**Meetings as organizer**

Riunione Annuale del Gruppo Italiano di Biomembrane e Bioenergetica, Udine, 14-16 giugno 2009

Annual Meeting of the Italian Group of Biomembranes and Bioenergetics, Udine, June 18-20, 2015

**Editorial activities**

Topic Editor: *Frontiers in Physiology,* Structure and Function of F- and V-ATPases, 2019

Ad hoc reviewer: *Annals of the New York Academy of Sciences*; *Biochimica et Biophysica Acta;* *Biochemical and Biophysical Research Communications; Biochemical Journal; British Journal of Pharmacology; Carcinogenesis International Journal of Cell Biology; Cell Death and Differentiation; Cell Metabolism; Cellular Physiology and Biochemistry; Evidence-Based Complementary and Alternative Medicine*; *FASEB Journal; FEBS Journal; Food Chemistry; Food Reviews International; Food Research International*; *Frontiers in Physiology; Frontiers in Oncology*; *Human Molecular Genetics; Innovative Food Science and Emerging Technologies;* *International Journal of Food Sciences & Nutrition*;  *Journal of Alzheimer’s Disease; Journal of Agricultural and Food Chemistry;* *Journal of Bioenergetics and Biomembranes; Journal of Biological Chemistry; Journal of Cellular and Molecular Medicine Journal of Neuroscience Research*; *Molecular Psychiatry;* *Oxidative Medicine and Cellular Longevity; Scientific Reports.*

**Bibliometric indications**

As of Januart, 2023 Prof. Lippe has published 91 peer-reviewed articles with an H index of 31 and [i10-index](javascript:void(0)) of 60 (Google Scholar). Her most quoted experimental paper [[Dimers of mitochondrial ATP synthase form the permeability transition pore.](http://www.ncbi.nlm.nih.gov/pubmed/23530243) V. Giorgio, S. von Stockum, M. Antoniel, A. Fabbro, F. Fogolari, M. Forte, G.D. Glick, V. Petronilli, M. Zoratti, I. Szabó, G. Lippe, P. Bernardi. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA. 110, 5887-92, 2013] has 907 citations; her most quoted review [[The Mitochondrial Permeability Transition Pore: Channel Formation by F-ATP Synthase, Integration in Signal Transduction, and Role in Pathophysiology.](http://www.ncbi.nlm.nih.gov/pubmed/26269524) P. Bernardi, A. Rasola, M. Forte, G. Lippe PHYSIOLOGICAL REVIEWS95, 1111-55, 2015] has 505 citations. Her “top ten” list gathers 2498 citations.

Other selected publications are:

1. Cannino G, Urbani A, Gaspari M, Varano M, Negro A, Filippi A, Ciscato F, Masgras I, Gerle C, Tibaldi E, Brunati AM, Colombo G, Lippe G, Bernardi P, Rasola A**.** The mitochondrial chaperone TRAP1 regulates F-ATP synthase channel formation**.** CELL DEATH & DIFFERENTIATION 2022 May 25. doi: 10.1038/s41418-022-01020-0.
2. Bernardi P, Carraro M, Lippe G. [The mitochondrial permeability transition: Recent progress and open questions.](https://pubmed.ncbi.nlm.nih.gov/34710270/) FEBS JOURNAL 2021 Oct 28. doi: 10.1111/febs.16254.
3. Galber C, Minervini G, Cannino G, Boldrin F, Petronilli V, Tosatto S, Lippe G, Giorgio V. The f subunit of human ATP synthase is essential for normal mitochondrial morphology and permeability transition. CELL REPORTS 2021 **35**(6):109111.
4. Zancani M, Braidot E, Filippi A, Lippe G. Structural and functional properties of plant mitochondrial F-ATP synthase. MITOCHONDRION2020 **53**:178-193.
5. Guo L, Carraro M, Carrer A, Minervini G, Urbani A, Masgras I, Tosatto SCE, Szabò I, Bernardi P, Lippe G. Arg-8of yeast subunit e contributes to the stability of F-ATP synthase dimers and to the generation of the fullconductance mitochondrial megachannel. THE JOURNAL OF BIOLOGICAL CHEMISTRY. 2019 **294** (28):10987-10997.
6. Lippe G, Coluccino G, Zancani M, Baratta W, Crusiz P. Mitochondrial F-ATP Synthase and Its Transition into an Energy-Dissipating Molecular Machine. OXIDATIVE MEDICINE AND CELLULAR LONGEVITY. eCollection 2019 doi: 10.1155/2019/8743257.
7. Carraro M, Checchetto V, Sartori G, Kucharczyk R, di Rago JP, Minervini G, Franchin C, Arrigoni G, Giorgio V, Petronilli V, Tosatto SCE, Lippe G, Szabó I, Bernardi P. High-Conductance Channel Formation in Yeast Mitochondria is Mediated by F-ATP Synthase e and g Subunits.. CELLULAR PHYSIOLOGY AND BIOCHEMISTRY. 2018 **50** (5) :1840-1855.
8. De Col V, Petrussa E, Casolo V, Braidot E, Lippe G, Filippi A, Peresson C, Patui S, Bertolini A, Giorgio V, Checchetto V, Vianello A, Bernardi P, Zancani M. Properties of the Permeability Transition of Pea Stem Mitochondria. FRONTIERS IN PHYSIOLOGY. 2018 **9**:1626.
9. Antoniel M, Jones K, Antonucci S, Spolaore B, Fogolari F, Petronilli V, Giorgio V, Carraro M, Di Lisa F, Forte M, Szabó I, Lippe G, Bernardi P. The unique histidine in OSCP subunit of F-ATP synthase mediates inhibition of the permeability transition pore by acidic pH.. EMBO REPORTS. 2018 **19** (2): 257-268.
10. Giorgio V, Burchell V, Schiavone M, Bassot C, Minervini G, Petronilli V, Argenton F, Forte M, Tosatto S, Lippe G, Bernardi P. Ca2+ binding to F-ATP synthase ß subunit triggers the mitochondrial permeability transition. EMBO REPORTS. 2017 **18** (7): 1065-1076.
11. Bernardi P, Di Lisa F, Fogolari F,Lippe G. From ATP to PTP and Back: A Dual Function for the Mitochondrial ATP Synthase. CIRCULATION RESEARCH. 2015 **116** (11):1850-62.
12. von Stockum S, Giorgio V, Trevisan E, Lippe G, Glick GD, Forte MA, Da-Rè C, Checchetto V, Mazzotta G, Costa R, Szabò I, Bernardi P. F-ATPase of Drosophila melanogaster forms 53-picosiemen (53-pS) channels responsible for mitochondrial Ca2+-induced Ca2+ release. THE JOURNAL OF BIOLOGICAL CHEMISTRY. 2014 **290** (8):4537-42.
13. Carraro M, Giorgio V, Šileikyte J, Sartori G, Forte M, Lippe G, Zoratti M, Szabò I, Bernardi P. Channel formation by yeast F-ATP synthase and the role of dimerization in the mitochondrial permeability transition. THE JOURNAL OF BIOLOGICAL CHEMISTRY. 2013 **289** (23): 15980-5.
14. Bisetto E, Comelli M, Salzano AM, Picotti P, Scaloni A, Lippe G, Mavelli I. Proteomic analysis of F1F0-ATP synthase super-assembly in mitochondria of cardiomyblasts undergoing differentiation to the cardiac lineage. BIOCHIMICA ET BIOPHYSICA ACTA 2013 **1827** (7):807-16.
15. Giorgio V, Bisetto E, Soriano ME, Dabbeni-Sala F, Basso E, Petronilli V, Forte MA, Bernardi P, Lippe G. Cyclophilin D modulates mitochondrial F0F1-ATP synthase by interacting with the lateral stalk of the complex. THE JOURNAL OF BIOLOGICAL CHEMISTRY. 2009 **284** (49):33982-8.
16. Bisetto E, Picotti P, Giorgio V, Alverdi V, Mavelli I, Lippe G. Functional and stoichiometric analysis of subunit e in bovine heart mitochondrial F(0)F(1)ATP synthase. JOURNAL OF BIOENERGETICS AND

BIOMEMBRANES. 2008 **40** (4):257-67.

1. Di Pancrazio F, Bisetto E, Alverdi V, Mavelli I, Esposito G, Lippe G. Differential steady-state tyrosinephosphorylation of two oligomeric forms of mitochondrial F0F1ATPsynthase: a structural proteomic analysis. PROTEOMICS. 2006 **6** (3):921-6.
2. Tomasetig L, Di Pancrazio F, Harris DA, Mavelli I, Lippe G. Dimerization of F0F1ATP synthase from bovine heart is independent from the binding of the inhibitor protein IF1. BIOCHIMICA ET BIOPHYSICA ACTA. 2002 **1556** (2-3):133-41.

**Funding**

Ministry for the University and Scientific Research, Italy: PRIN 2017 - Channel formation by mitochondrial ATP synthase: Mechanisms and regulation

Regione Autonoma Friuli Venezia Giulia, Italy: Bando 2017 P.O.R.FESR