Rosario Rizzuto
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Personal data

Born in Rome (Italy) on April 15th, 1962
Living in Padua, Italy
Married, 3 children

Current position

Professor of General Pathology, University of Padua, Italy
President of the National Center on Gene Therapy and RNA-based therapies

Work experience

2021-date
Cassa di Risparmio di Padova e Rovigo
Member of the General Council

2019-2021
Coimbra Group Universities
Member of the Rectors' Advisory Group

2019-2021
European University Association (EUA)
Member of the Research Policy Working Group

2019-2021
Conference of the Rectors of Italian Universities (CRUI), Rome, Italy
Member of the steering committee ("Giunta") and delegate for Research and Innovation
Coordinator of the Research Committee

2015-2021
University of Padua, Padua, Italy
Rector

2009-2015

Department of Biomedical Sciences
University of Padua, Padua, Italy
Head of the Department

2008-date
Department of Biomedical Sciences
University of Padua, Padua, Italy
Full Professor of General Pathology

2007-2008
School of Pharmacy
University of Ferrara, Ferrara, Italy
Dean of the School

2002-2008
School of Pharmacy
University of Ferrara, Ferrara, Italy
Full Professor of General Pathology

1998-2002
School of Pharmacy
University of Ferrara, Ferrara, Italy
Associate Professor of General Pathology

1992-1998
School of Medicine
University of Padua, Padua, Italy
Assistant Professor of General Pathology

1991-1992
Department of Experimental Biomedical Sciences
University of Padua, Padua, Italy
Research Associate

Education

1991
University of Padua, Padua, Italy
Department of Experimental Biomedical Sciences
Ph.D. in Molecular and Cellular Biology and Pathology

1987-88
Columbia University, New York, USA
H. Merritt Center for the Study of Neuromuscular Disorders
2-year research stage

1986

University of Padua, Padua, Italy
School of Medicine
Medical degree, summa cum laude

Honours, Awards and Memberships

2020: Commander of the order of merit of the Italian Republic
2014: Antonio Feltrinelli Award of the Accademia dei Lincei
2004: Theodore Bucher Medal
2002: Chiara D'Onofrio Prize
2001: Biotec Award

2017-date: Fellow of the *Istituto Veneto di Scienze, Lettere ed Arti*
2015-date: Fellow of the *Accademia Galileiana di Scienze Lettere ed Arti in Padova*
2013-date: Member of the European Molecular Biology Organization (EMBO)
2008-date: Member of the Academia Europaea, Section of Physiology and Medicine

SCIENTIFIC ACTIVITY

Coordinator of the Research Group on MITOCHONDRIAL CALCIUM SIGNALLING at the Department of Biomedical Sciences, University of Padua (Italy): https://www.biomed.unipd.it/ricerca/aree-tematiche/mitochondrial-pathophysiology/mitochondrial-calcium-signalling

Research keywords and abstract

5 keywords
cell signalling
calcium homeostasis
mitochondria
apoptosis/autophagy
muscle physiology

Abstract

The research interest of Prof. Rizzuto has been centered on the study of cellular signalling, with special focus on intracellular calcium homeostasis. He pioneered the use of molecularly engineered recombinant luminescent and fluorescent proteins for studying calcium homeostasis at the subcellular level. Subcellular targeting first of the luminescent protein aequorin of *Aequorea victoria*, and then of luciferase of *Photinus pyralis* and of the continuously expanding group of fluorescent probes based on green fluorescent protein (GFP) of *Aequorea victoria*, allowed major advancements in the study of calcium signalling, cellular metabolism and organelle morphology. With this methodological

breakthrough, new biological concepts have been acquired, which include i) the participation of mitochondria in cellular Ca^{2+} homeostasis and their role in translating calcium signals in effects as diverse as stimulation of metabolism and induction of cell death, ii) the occurrence and significance of signalling microdomains in the proximity of mitochondria, iii) the identification of the Golgi apparatus as an agonist-sensitive Ca^{2+} store, and iv) the major Ca^{2+} rises occurring under the plasma membrane upon cell stimulation, to cite a few. In 2011, using a combination of experimental approaches (in silico search, reconstitution in planar lipid bilayers and electrophysiological characterization, expression and silencing in cultured cells, site-specific mutagenesis) he identified the mitochondrial calcium uniporter (MCU), the only fundamental component of the cellular calcium signalling machinery yet to be discovered. This result has opened, with an explosive pace, the molecular era of mitochondrial Ca^{2+} homeostasis, that combines the molecular insight into a multi-subunit protein complex, radically different from all other cellular channels, to the possibility of clarifying the role of mitochondria calcium homeostasis in the physiological regulation of tissues and in the pathogenesis of highly prevalent human diseases (neurodegenerative disorders, ischemic heart disease, cancer). Recent data on the role of MCU on muscle trophism and inflammasome control have provided a solid background to the possibility of targeting MCU with traditional and RNA-based drugs for treating pathological conditions such as age- and disease-related sarcopenia and inflammation-based diseases, such as inflammatory bowel diseases, lung fibrosis and atherosclerosis. Finally, with an approach similar to that employed for the discovery of MCU, also the long-sought and debated mitochondrial K_{ATP} channel, proposed to be a primary regulator of ischemic pre-conditioning, has been identified by Prof. Rizzuto's research team in 2019 and shown to control the volume of the mitochondrial matrix and the activity of respiratory complexes.

Research Projects - Principal Investigator

The research activity of prof. Rizzuto has been supported through the year by grants from the European Research Council (ERC Ideas Advanced grant - MitoCALCIUM: Mitochondrial calcium signalling: molecules, roles and pharmacological targeting), the EU FP programs, the National Institute of Health, the Italian Association for Cancer Research (AIRC), Telethon- Italy, the Italian Education and Health Ministries and the Cariparo and Cariplo bank foundations.

Bibliometry

ORCID: https://orcid.org/0000-0001-7044-5097

According to **Google Scholar** (User: OW0gQfUAAAAJ&hl): Total Citations: 71861.
H-Index: 121.
According to **Scopus** (Author ID 7005289262): Total Citations: 46156.
H-Index: 105.
According to **WoS** (Researcher ID B-6312-2008): Total number of citations: 43444.
H-index: 103.

Ranked 42nd in Top Italian Scientists (Biomedical Sciences)
https://www.topitalianscientists.org/TIS_HTML/Top_Italian_Scientists_Biomedical_Sciences.htm

Publications

306 full articles cited in Pubmed (https://pubmed.ncbi.nlm.nih.gov/)

https://scholar.google.com/citations?user=OW0gQfUAAAAJ&hl=it&oi=ao

Selected publications

5 publications (last 10 years)

1. S. Feno, F. Munari, D.V. Reane, R. Gissi, D.H. Hoang, A. Castegna, B. Chazaud, A. Viola*, R.Rizzuto*, A. Raffaello* (2021). The dominant negative mitochondrial calcium uniporter subunit MCUb drives macrophage polarization during skeletal muscle regeneration. Sci. Signal. 14(707):eabf3838.
2. A. Paggio, V. Checchetto, A. Campo, R. Menabò, G. Di Marco, F. Di Lisa, I. Szabo, R. Rizzuto*, D. De Stefani* (2019). Identification of an ATP-sensitive potassium channel in mitochondria. Nature 572:609-613.
3. M. Patron, V. Checchetto, A. Raffaello, E. Teardo, D. Vecellio Reane, M. Mantoan, V. Granatiero, I. Szabò, D. De Stefani* and R. Rizzuto* (2014) MICU1 and MICU2 finely tune the mitochondrial Ca^{2+} uniporter by exerting opposite effects on MCU activity. Mol. Cell 53:726-737.
4. A. Raffaello, D. De Stefani, D. Sabbadin, E. Teardo, G. Merli, A. Picard, V. Checchetto, S. Moro, I. Szabò, R. Rizzuto* (2013) The mitochondrial calcium uniporter is a multimer that can include a dominant-negative pore-forming subunit. EMBO J. 32:2362-76.
5. R. Rizzuto*, D. De Stefani, A. Raffaello, C. Mammucari (2012) Mitochondria as sensors and regulators of calcium signalling. Nat. Rev. Mol. Cell Biol. 9, 566-578.

*corresponding author

5 publications (whole career)

1. D. De Stefani, A. Raffaello, E. Teardo, I. Szabo, R. Rizzuto* (2011) A forty-kilodalton protein of the inner membrane is the mitochondrial calcium uniporter. Nature 476:336-340.
2. P. Pinton, A. Rimessi, S. Marchi, F. Orsini, E. Migliaccio, M. Giorgio, C. Contursi, S. Minucci, F. Mantovani, M. R. Wieckowski, G. Del Sal, P. G. Pelicci, R. Rizzuto* (2007) Protein kinase C beta and prolyl isomerase 1 regulate mitochondrial effects of the life-span determinant p66Shc. Science 315:659-663.
3. R. Rizzuto*, P. Pinton, W. Carrington, F. S. Fay, K. E. Fogarty, L. M. Lifshitz, R. A. Tuft, T. Pozzan* (1998) Close contacts with the endoplasmic reticulum as determinants of mitochondrial Ca^{2+} responses. Science 280:1763-1766.
4. R. Rizzuto*, M. Brini, M. Murgia, T. Pozzan* (1993) Microdomains with high Ca^{2+} close to IP3-sensitive channels that are sensed by neighboring mitochondria. Science 262:744-747.
5. R. Rizzuto*, A. W. Simpson, M. Brini, T. Pozzan* (1992) Rapid changes of mitochondrial Ca^{2+} revealed by specifically targeted recombinant aequorin. Nature 358:325-327.

*corresponding author

Editorial Activity

Prof. Rizzuto routinely acts as reviewer for international scientific journals (Nature, Science, Cell, J. Cell Biol., EMBO J., J. Biol. Chem., Trends Cell Biol., etc.) and granting agencies (he is currently member of European Research Council and EMBO review panels).

Program Chairs/Organization Committee

- Gordon Research Conference on Calcium Signalling, Renaissance Tuscany Il Ciocco, Lucca, Italy, June 2013 (Chair: R. Rizzuto; vice-chair: D.I. Yule)
- Gordon Research Conference on Calcium Signalling, Colby Sawyer College- New London- NH, USA, June 2011 (chair. K. Foskett; vice-chair: R. Rizzuto)
- EMBO Workshop on "Calcium signaling and diseases", Capri, Italy, September 2004 (organizers: E. Carafoli, R. Rizzuto)
- 12th International Symposium on Calcium Binding Proteins and Calcium Function in Health and Disease - Cavalese, Italy, February 2002 (organizers: E. Carafoli, R. Rizzuto, T. Pozzan)

Keynote speeches and lectures

Prof. Rizzuto gave >300 lectures at national and international meetings (including >20 plenary lectures) and seminars in Universities and Research Institutes.