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ISTITUTO PER L'ENDOCRINOLOGIA
E L'ONCOLOGIA SPERIMENTALE
"G. SALVATORE"
2nd UNIT

Seminar

Friday, 6th October 2023, 14:30h CEST

Jomon Joseph

National Centre for Cell Science, Pune,
India

**Cell Biology of
Annulate Lamellae - an
underexplored
organelle**

Host: Antonino Colanzi (antonino.colanzi@cnr.it)

Conference Room, CNR, P. Castellino Campus



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Abstract: Annulate lamellae (AL) are subdomains of the endoplasmic reticulum (ER) characterized by stacked membranes containing a subset of nucleoporins including Nup358. The cellular functions of AL are relatively unknown. ER also makes physical connections with mitochondria through ER-mitochondria contact sites (ERMCSs). Recent studies have shown that ERMCS are important in regulating many of the functions mediated by ER and mitochondria such as inter-organellar Ca^{2+} and lipid transfer, apoptosis, mitochondrial energetics and autophagy. We find that Nup358-positive AL are present at the ERMCSs and depletion of Nup358 results in induction of autophagy. Mechanistically, we show that Nup358 interacts with an ERMCS tethering complex consisting of IP3R, GRP75 and VDAC, which also regulates Ca^{2+} homeostasis between ER and mitochondria. Depletion of Nup358 reduces the level of mitochondrial porin VDAC, thereby reducing the uptake of Ca^{2+} from cytosol to mitochondria. As a consequence, Ca^{2+} released by IP3R from the ER accumulates in the cytosol, which leads to calcium-induced autophagy through activation of the CaMKK2/AMPK pathway. Moreover, we also find a role for Nup358 in regulating the ERMCSs via restricting mTORC2/Akt activation. Our results uncover an unexpected role for AL, and particularly for Nup358, in cellular homeostasis by regulating ERMCSs and their functions.

Biography:

Research Interests

Cell biology of Annulate Lamellae, ER-mitochondrial contact sites, Intercellular communication, Extracellular vesicles

Education

Post-doctoral Fellow, 2000-2005, National Institutes of Health, Bethesda, USA

Ph.D. (Biochemistry), 2000, Indian Institute of Science, Bangalore, India

M.Sc. (Agriculture), 1993, University of Agricultural Sciences, Bangalore, India

Experience

Scientist G, 2022-present, National Centre for Cell Science, Pune, India

Scientist F, 2016-2021, National Centre for Cell Science, Pune, India

Scientist E, 2010-2016, National Centre for Cell Science, Pune, India

Scientist D, 2005-2010, National Centre for Cell Science, Pune, India

Fogarty International Research Fellow, 2000-2005, NICHD, NIH, USA

Affiliations and Awards

Elected Member, Guha Research Conference, 2019

Elected Member, Molecular Immunology Forum, 2019

Life Member, Indian Society for Cell Biology (2008 onwards)

Life Member, Society of Biological Chemists, India (2014 onwards)

Life Member, Indian Society for Developmental Biologists (2017 onwards)

International Travel Award from EMBO for attending EMBO Conference on 'Ubiquitin and SUMO: From molecular mechanisms to system-wide responses' (2017)

International Travel Award from organizers of 'WNT meeting' (2010)

John E. Fogarty International Visiting Fellowship (Postdoctoral, 2000-2005)

Council of Scientific and Industrial Research-Senior Research Fellowship (1996-1999)

Council of Scientific and Industrial Research-Junior Research Fellowship (1993-1996)

Indian Council of Agricultural Research-Junior Research Fellowship (1991-1993)

National Merit Scholarship (1984-1990)