

1. Record Nr.	UNINA9910220049603321
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Titolo	Molecular Mechanisms and Physiological Significance of Organelle Interactions and Cooperation
Pubbl/distr/stampa	Frontiers Media SA, 2017
Descrizione fisica	1 online resource (151 p.)
Collana	Frontiers Research Topics
Soggetti	Biology, life sciences
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	<p>Eukaryotic cells contain distinct membrane-bound organelles, which compartmentalise cellular proteins to fulfil a variety of vital functions. Many organelles have long been regarded as isolated and static entities (e.g., peroxisomes, mitochondria, lipid droplets), but it is now evident that they display dynamic changes, interact with each other, share certain proteins and show metabolic cooperation and cross-talk. Despite great advances in the identification and characterisation of essential components and molecular mechanisms associated with the biogenesis and function of organelles, information on how organelles interact and are incorporated into metabolic pathways and signaling networks is just beginning to emerge. Organelle cooperation requires sophisticated targeting systems which regulate the proper distribution of shared proteins to more than one organelle. Organelle motility and membrane remodeling support organelle interaction and contact. This contact can be mediated by membrane proteins residing on different organelles which can serve as molecular tethers to physically link different organelles together. They can also contribute to the exchange of metabolites and ions, or act in the assembly of signaling platforms. In this regard organelle communication events have been associated with important cellular functions such as apoptosis, antiviral defense, organelle division/biogenesis, ROS metabolism and signaling, and various metabolic pathways such as breakdown of fatty acids or cholesterol biosynthesis. In this research topic we will focus on recent</p>

novel findings on the underlying molecular mechanisms and physiological significance of organelle interaction and cooperation with a particular focus on mitochondria, peroxisomes, endoplasmic reticulum, lysosomes and lipid droplets and their impact on the regulation of cellular homeostasis. Our understanding of how organelles physically interact and use cellular signaling systems to coordinate functional networks between each other is still in its infancy. Nevertheless recent discoveries of defined membrane structures such as the mitochondria-ER associated membranes (MAM) are revealing how membrane domains enriched in specific proteins transmit signals across organelle boundaries, allowing one organelle to influence the function of another. In addition to its role as a mediator between mitochondria and the ER, contacts between the MAM and peroxisomes contribute to antiviral signaling, and specialised regions of the ER are supposed to initiate peroxisome biogenesis, whereas intimate contacts between peroxisomes, lipid droplets and the ER mediate lipid metabolism. In line with these observations it is tempting to speculate that further physical contact sites between other organelles exist. Alternatively, novel regulated vesicle trafficking pathways between organelles (e.g., mitochondria to peroxisomes or lysosomes) have been discovered implying another mode of organelle communication. Identifying the key molecular players of such specialised membrane structures will be a prerequisite to understand how organelle communication is physically accomplished and will lead to the identification of new regulatory networks. In addition to the direct transmission of interorganellar information, cytosolic messenger systems (e.g., kinase/phosphatase systems or redox signaling) may contribute to the coordination of organelle functions. This research topic will integrate new findings from both modes of communication and will provide new perspectives for the functional significance of cross-talk among organelles. We would like to thank all the researchers who contributed their valuable work to this research topic. Furthermore, we are grateful to the reviewers and Associate Editors who contributed valuable comments and positive criticism to improve the contributions.

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