

Biological Sciences



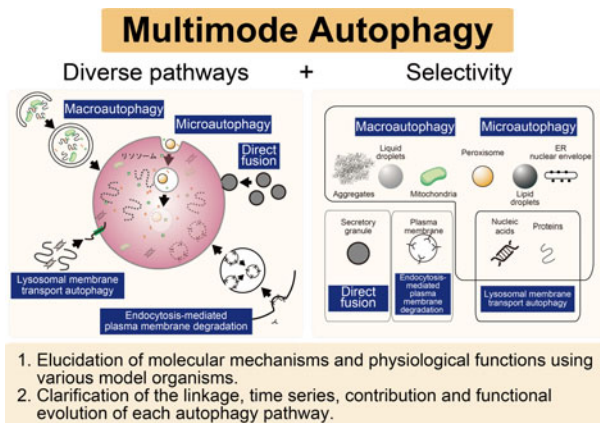
Title of Project : Multimode autophagy: Diverse pathways and selectivity

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Research Project Number : 19H05705 Researcher Number : 90356254

【Purpose of the Research Project】

During the past two decades, studies on macroautophagy have explosively expanded from the molecular mechanism to disease states. However, autophagy research is not showing any signs of convergence; rather, new discoveries provide plenty of novel issues that should be resolved. In fact, although a large number of autophagy-related proteins have been identified and characterized so far, even the basic frame in which they operate for membrane biogenesis is not yet established. Furthermore, the existence of the mysteries beyond the conventional concept, that is, "diverse autophagy pathways" and "selectivity of autophagy" has become apparent. For an integrated understanding of these fundamental issues, it is essential to strategically promote high-quality autophagy research. In this project, various pathways of autophagy and their selective degradation mechanisms are integrated and defined as "multimode autophagy", and we will clarify their molecular mechanisms and physiological functions. Further, we aim to seek an understanding of the whole cellular self-degradation process by elucidation of the linkage, time series, contribution and functional evolution of each autophagy pathway (Figure). In addition, we will establish a working platform that can efficiently promote autophagy research by interdisciplinary fusion, training of young researchers and international activities.



【Content of the Research Project】

Group members are going to advance studies on diverse autophagy pathways such as macroautophagy, microautophagy, lysosomal membrane transport autophagy,

endocytosis-mediated plasma membrane degradation and on their selective degradation using various model organisms. In addition, members who are experts for X-ray crystal structural analysis, three-dimensional electron microscopy, and omics analyses, elucidate the mechanism at the atomic level, visualize membrane dynamics, identify specific substrates, profile gene expression and metabolic variation and determine composition of membranes.

We are going to establish a website for "Multimode autophagy" and an "Autophagy web forum" to clarify the purpose of this research project and to announce research results, respectively. In order to foster joint research with researchers from public offering and new different fields, we will disclose the unresolved issues of multimode autophagy in the website and problems that are difficult to solve by the current members alone. Besides, we will hold group meetings in conjunction with open domestic autophagy conferences every year.

【Expected Research Achievements and Scientific Significance】

We will elucidate the complex and diverse mechanisms of membrane dynamics of multimode autophagy, and the overall picture of self-degradation. From the former, we will be able to propose a new basic axis of membrane dynamics in cell biology that has never been achieved, and from the latter, we will understand the entire intracellular degradation process combined with the ubiquitin-proteasome and other degradation systems.

【Key Words】

Multimode autophagy: Integration between diverse pathways of autophagy and their selectivity.

【Term of Project】 FY2019-2023

【Budget Allocation】 1,199,600 Thousand Yen

【Homepage Address and Other Contact Information】

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