

【Grant-in-Aid for Scientific Research(S)】
Biological Sciences (Biology)



Title of Project : Signal transduction networks regulating life span and development

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Research Area : Biology, Biological science, Functional biochemistry

Keyword : Cell signal transduction

【Purpose and Background of the Research】

Elucidating intracellular signal transduction networks is important for our understanding of various biological processes. Because genome projects for human and other model organisms have been completed, it is now important to define not only the function of individual genes but also the functional interrelationships between individual genes. Although enormous amounts of large scale and high throughput analyses have recently generated huge amounts of data on gene structure and expression, the entire picture of gene function and interaction from the perspective of signal transduction has not yet been elucidated. Therefore, it is very crucial for our understanding of fundamental principles of biological phenomena to utilize vast amounts of genome data and to uncover how each signal transduction pathway interacts with each other and cooperates to regulate systemic biological functions. In this research project, we focus on life span and development of multicellular organisms, which involve biological processes that occur along a temporal axis. Our goal is to identify novel components, novel pathways, and novel networks of intracellular signal transduction regulating life span and development, through multidisciplinary approaches using model organisms.

【Research Methods】

First, we will identify novel components and pathways of intracellular signal transduction regulating life span and development by gene expression analysis using microarray, promoter analysis using bioinformatics, systematic RNA interference screening, systematic screening of mutants, and knockdown experiments using antisense morpholino oligonucleotides. Second, we will study functional interactions between known and novel signaling pathways and uncover signal transduction networks in the context of systemic biological processes such as life span and development.

【Expected Research Achievements and Scientific Significance】

By identifying intracellular signal transduction networks regulating life span and development, our study will provide the fundamental principles of signal transduction pathways that act in vivo, and will give a breakthrough in the research fields of signal transduction, aging biology and developmental biology.

【Publications Relevant to the Project】

Honjoh, S., Yamamoto, T., Uno, M., and Nishida, E. Signalling through RHEB-1 mediates intermittent fasting-induced longevity in *C. elegans*. *Nature* 457, 726-730 (2009).

Hanafusa, H., Matsumoto, K., and Nishida, E. Regulation of ERK activity duration by Sprouty contributes to dorsoventral patterning. *Nature Cell Biol.* 11, 106-109 (2009).

【Term of Project】 FY2009-2013

【Budget Allocation】 164, 000 Thousand Yen

【Homepage Address and Other Contact Information】

<http://www.lif.kyoto-u.ac.jp/labs/signal/>