Title of Project：Chromatin Structure, Dynamics, and Function

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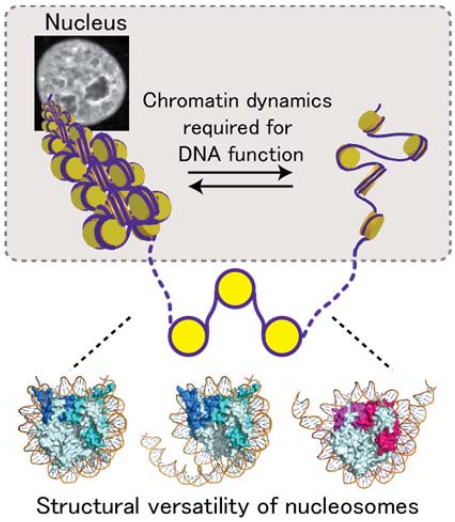
【Purpose of the Research Project】

In eukaryotes, genomic DNA is organized into chromatin within the nucleus. The fundamental repeating unit of chromatin is the nucleosome, which contains ~150 base pairs of DNA wrapped around a histone octamer. The higher-order chromatin structure is established through interactions with many proteins and RNAs that associate with nucleosomes and/or DNA. Whereas the nucleosome structure may play an inhibitory role in DNA metabolism, such as replication, transcription, and recombination, various nuclear machineries are capable of altering the chromatin structure to make it compatible with their respective metabolic processes. However, how chromatin structure and dynamics regulate DNA functions in the genomic DNA remains largely unknown. The aim of the research project “Chromatin Structure, Dynamics, and Function” is to understand the structural basis of chromatin dynamics and function.



Structural versatility of nucleosomes

【Content of the Research Project】

In the proposed project, we will employ a variety of methodologies, such as structural analysis, computational simulation, proteomics, genomics, live cell imaging, genetics, and cell biology, to study the dynamic behavior of chromatin at different levels. This interdisciplinary research project covers a wide range of structural and functional analyses, from atomic structures to higher-order structures in living animals. As collaborative research in this project, we will establish a novel chromatin reconstitution method for functional studies of chromatin structures and dynamics *in vitro* and *in vivo*. The goal of the proposed project is to understand the structures and the functional regulation of chromatin in eukaryotes.

【Expected Research Achievements and Scientific Significance】

This research project will achieve significant progress in understanding the molecular mechanisms of the structures and functions of chromatin in the nucleus. As chromatin regulation plays an important role in the maintenance, inheritance, and expression of the genome, the outcome of this project can contribute to broad areas in biology, from basic sciences such as epigenetics, chromatin, and gene regulation, to more clinically-oriented studies involving genetic disease, cancer, and regenerative medicine.

【Key Words】

Chromatin: The nuclear macromolecular complex composed of nucleosomes, as the basic repeating units, and the associated proteins and RNAs.

【Term of Project】 FY2013-2017

【Budget Allocation】 1,156,400 Thousand Yen

【Homepage Address and Other Contact Information】

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