

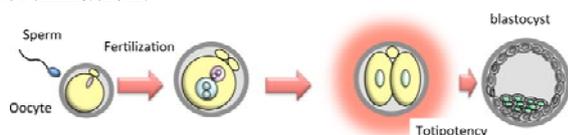


**Title of Project : Epigenome dynamics and regulation in germ cells**

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**【Purpose of the Research Project】**

Germ cells are unique in that they have the capacity to contribute genes to offspring. This suggests that they have unique biological characteristics that are not found in somatic cells. Studies on germ cells have shown many differences between germ cells and somatic cells, but also contributed greatly to the development of human infertility treatment, such as in vitro fertilization.



Recent studies on germ cells have shown critical roles of epigenetic gene regulators in germ cell fate determination. Germ cells have to erase their epigenetic information during transmitting the genetic information to the offspring. Such dynamic epigenetic changes are found only in germ cells, which have implications in understanding the mechanism of genomic imprinting and nuclear cloning. In the past five years, many epigenetic modifier genes were cloned, and the functions of these genes were analyzed by gene targeting. Moreover, the role of germ cell-specific small RNAs in DNA methylation induction was also recently discovered, which increased our knowledge on the mechanism of DNA methylation and its relationship with histone modification. Although we still do not know all the molecules involved in the epigenetic regulation in germ cells, we are now at the stage to understand how these epigenetic regulators are coordinated to form stage-specific epigenome during germ cell development. Understanding the basic principle of epigenome formation and maintenance will be an important goal of this project.

Another notable development in recent years is the manipulation of epigenome. It has become possible to control and normalize deregulated gene expression by manipulating epigenome. Development of new methods to manipulate epigenome will be another important goal of our team.

**【Content of the Research Project】**

This research project is carried out by collaboration of scientists who are specialized in germ cells and epigenetics research. The project is divided into three groups: (1) spermatogenesis, (2) oogenesis and fertilization, and (3) pigenome analysis. These three groups will focus on the following two topics.

1. To understand the molecular mechanism of how the epigenetic network is formed and maintained during germ cell development.
2. To develop new methods to correct deregulated epigenome program in germ cells and embryos.

**【Expected Research Achievements and Scientific Significance】**

Our project will clarify the reprogramming mechanism of germ cells at the molecular level, which will deepen our knowledge on the difference between germ cells and somatic cells. In addition, development of new methods for epigenetic manipulation will have important implications for preventing human diseases and improvement of health.

**【Key Words】**

germ cells, epigenetics, fertilization, reprogramming

**【Term of Project】** FY2013-2017

**【Budget Allocation】** 1,119, 200 Thousand Yen

**【Homepage Address and Other Contact Information】**

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