Analysis of regulatory mechanisms of differentiation and apoptosis of mammalian oocytes for establishment of developmental biotechnology in next generation

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【 Outline of survey 】

In the cow, 100 - 200 thousand oocytes are produced in the ovary and are potentially available. Many of them die in the course of oogenesis, and usually only 1 of them is ovulated in each estrus cycle, and 100 - 200 of them are ovulated even in the life time. Thus, there is a mechanism in the mammalian ovary to selectively ovulate a small number of oocytes and induce death in most of them. We have started experimenting on the assumption that selective oogenesis can be avoided, and death of oocytes can be prevented, by analyzing regulatory mechanisms of differentiation and apoptosis of oocytes. Collection of more oocytes from one animal is expected to become possible as a result of such investigation, and the availability of more oocytes from the same will make animal clones produced by nuclear transplantation more like clones.

This research of oocytes may lead to the establishment of new biology or medical technology. Cells constituting the body are conditioned to perform specific functions. Genes of these cells have been considered to be irreversibly modified to perform only specific functions. However, the birth of the "clone animals" demonstrated that the nucleus of a cell that performs a specific function reclaims " omnipotential of differentiation" as it is transplanted to an oocyte. We wish to clarify such a function of the oocyte by accumulating the knowledge of regulatory factors and genes expressing in oocytes.

【 Expected results 】

Collection of more oocytes from one animal is expected to become possible as a result of our investigation and improvement of animal will be done using oocytes recovered from superior female. Moreover, the availability of more oocytes from the same will make animal clones produced by nuclear transplantation more like clones. A function of the oocyte which induces "omnipotential of differentiation" of somatic cells will be clarified by accumulating the knowledge of regulatory factors and genes expressing in oocytes.

【 References by the principal researcher 】

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【 Term of project 】 FY 2004 — 2008 | 【 Budget allocation 】 80,400,000 yen

【 Homepage address 】 http://www.bios.tohoku.ac.jp/seisyoku/index-j.html