CDB SEMINAR

Mika Katayama

Division of Animal Science, University of Missouri-Columbia

Tuesday, October 9, 2007
16:30~17:30 C6F Seminar Room

Developmental ability of individual 2-cell blastomeres in mice

In mammals, the first phenomenon of cell differentiation during embryo development is the cell commitment either to inner cell mass or trophoblast cells that is regulated by the location of blastomeres after 8 cell stage. Inner cell mass and trophoblast cells are formed from the blastomeres located inner side and outer surface of compacted/morula embryos, respectively. It is considered that all blastomeres in an embryo are identically totipotent until the 8 cell stage in which all blastomeres are equally subjected to outer and inner environments. Recently, there are reports that individual blastomeres from 2-cell stage murine conceptuses make different contributions to the embryonic and abembryonic regions in blastocysts, implying that they differ from each other in developmental potential, although other studies do not support this contention. Using the expression pattern of Oct4 and Cdx2 which are transcription factors specific for inner cell mass and trophectoderm cell lineage, respectively, we have examined the timing of cell differentiation in early embryos, differential potential and cell fate of individual blastomeres of 2-cell embryos in two non- inbred strains of mouse, NIH-Swiss and CF1. Our major finding is that the timing of expression of Cdx2 during conceptus development differs between mouse strains, occurring earlier in the CF1 strain than the NIH Swiss strain. Accordingly, the initiation of lineage commitment to trophectoderm may also vary among mouse strains. Our results also suggest that in CF1 but apparently not in NIH Swiss conceptuses blastomeres at the 2-cell stage do differ in their abilities to contribute to the embryonic region of blastocysts. Although our data are consistent with the view that there is considerable plasticity in early mouse development in terms of lineage commitment, they also appear to explain why there is so much controversy over pre-patterning. We suggest that the choice of mouse strain has led different groups to apparently contradictory conclusions about pre-patterning in mouse embryo development. Including our data and studies reported by others recently, the regulation mechanisms of embryo development in mammals will be discussed.

Host:
Teruhiko Wakayama
Genomic Reprogramming, CDB
teru@cdb.riken.jp
Tel:078-306-3049 (ext:4403)