Epigenetics

1. Staffs and Students (April 2010)

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2. Purpose of Education

"Epigenetics" coupled with "Genetics" enables us to elucidate several 'genomic functions' in inheritance, development and evolution of organisms including our human beings. Genomic imprinting is one of the mammalian specific gene regulation mechanisms that gives rise to functional differences between paternally- and maternally-derived genomes in development, behavior and growth. Somatic cloned animals give us unique chances to examine 'genetically identical but epigenetically diverged animals'. These studies show us how Epigenetics is important in mammalian biology. Our department focuses these mammalian specific genomic functions to elucidate how these genomic functions work and how new genomic functions have been evolved during evolution. Our final goal is to contribute to the 21th's medicine and human biology by novel understanding of genomic functions.

3. Research Subjects

1) Genomic imprinting in human and mammalian development.
2) Placenta function and its evolution in mammals.
3) Somatic cloning: its epigenetic effects and application to regenerative medicine.
4) Assisted reproductive technology: its epigenetic effects and safer application.
5) Role of retrotransposon-derived genes in mammalian specific genomic functions.

4. Publications

Original Article

1. Kobayashi, S., Fujihara, Y., Mise, N., Kaseda, K., Abe, K., Ishino, F. and Okabe, M. The X-linked imprinted gene family *Fthl17* shows predominantly female expression following the two-cell stage in mouse embryos. Nuc Acids Res **38**(11), 3672-3681 (2010).
2. Kaneko-Ishino, T. and Ishino, F. Retrotransposon silencing by DNA methylation contributed to the evolution of placentation and genomic imprinting in mammals. Develop Growth Differ **52**(6), 533-543 (2010).
3. Inoue, K., Kohda, T., Sugimoto, M., Sado, T., Ogonuki, N., Matoba, S., Shiura, H., Ikeda, R., Mochida, K., Fujii, T., Sawai, K., Otte, A. P., Tian,X. C., Yang, X., Ishino, F. Abe, K. and Ogura, A. Impeding *Xist* expression from the active X chromosome improves mouse somatic cell cloning. Science **330**(6003),496-499 (2010).