Dev. Reprod. Vol 8, No 1, 2004(Suppl). pp 24

Regulation of Histone Acetylation during the First Mitosis in Cloned Bovine Embryos

Gabbine Wee[1], Deog-Bon Koo[1], Man-Jong Kang[2],
Seung Ju Moon[2], Kyung-Kwang Lee[1] and Yong-Mahn Han[1]
[1]Laboratory of Development and Differentiation,
Korea Research Institute of Bioscience and Biotechnology,
[2]Department of Animal Science, Chonnam National University

Histone acetylation plays a critical role in gene expression through the interaction of nucleosomes with DNA. It modulates the efficiency of RNA polymerase to interact with promotors in transcription initiation. After fertilization, chromatin is highly acetylated and maintained in the 1 cell stage. Hyperacetylation affects embryonic genome activation and development. In this study, we examined changes of histone acetylation during mitosis by the antibody against acetylated histone H4 lysine 5 (AcH4K5) in the chromatin of somatic cells, fertilized, or reconstructed 1 cell-embryos. In bESF cells, the degree of H4 hyperacetylation increased 60h after the treatment of trichostatin A (TSA), an inhibitor of histone deacetylase, and the hyperacetylation level raised twice compared to non-treated cells. From the metaphase to early telophase in bESF cells, the level of histone h4 acetylation is decreased continuously as chromatin condensed, but gradual hyperacetylation occurs from late telophase to early interphase. TSA treatment in the chromosomes of prophase, metaphase, and anaphase induced hyperacetylation detected by the AcH4K5 antibody. Condensation or decondensation of chromatin was not effected the histone acetylation in TSA treated cells. In the mitosis of 1 cell embryos, the acetylation signal of NT embryos disappeared at the first metaphase, whereas IVF and TSA-NT embryos maintained acetylation. These differences suggest that the cell memory in donor cells seems to play an important role. We found that epigenetic reprogramming of aberrant histone modification occurs as early as the pronuclear stage in reconstructed oocytes.

Key words: Histone acetylation, Trichstatin A, embryos, mitosis, donor cell