

SIZE-DEPENDENT ACQUISITION OF GLOBAL DNA METHYLATION IN OOCYTES IS ALTERED BY HORMONAL STIMULATION

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ABSTRACT

Administration of exogenous gonadotropins (superovulation) is used to increase the number of mature oocytes to circumvent the inefficiencies of the subsequent assisted reproductive technologies procedures. Some evidence points at this seemingly harmless procedure as a causative factor in the etiology of some epigenetic syndromes as well as abnormal embryonic and fetal growth in humans and mice. The objective of this study was to determine the acquisition pattern of DNA methylation during mouse oocyte growth and the effects of superovulation on the acquisition of DNA methylation. Methylated DNA in oocytes was localized in ovarian sections by the use of an antibody. We found that the level of methylation increases with the increased size of oocyte from 10 to >70 μm diameter. DNA methylation was significantly different in medium (50-60 μm) and full-grown oocytes between natural and superovulated mice. We speculate that proper acquisition of DNA methylation is necessary to attain full developmental competence of oocyte and aberrant methylation caused by superovulation may in part be responsible for the lower developmental competence observed in embryos produced from oocytes of superovulated females. We also determined the expression level of genes required for the establishment and maintenance of DNA methylation. We found no differences in gene expression between groups.