Public Abstract

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Title: Size-dependent Acquisition of Global DNA Methylation in Oocytes is Altered by Hormonal Stimulation.

The overall worldwide prevalence of women infertility is nine percent with fifty six percent of couples seeking medical care. Assisted reproductive technologies (ART) are commonly used for the treatment of infertility/subfertility. The percent of children born from ART ranges from 0.1 to 3.9 of all children born in developed countries. Ovarian hyperstimulation or superovulation (SO) by administration of exogenous gonadotropins is a common procedure of ART used to increase the number of mature oocytes. Published works have shown that children born from ART have increased incidence of epigenetic disorders. In mice, studies found that superovulation caused delayed embryonic development, higher rate of abnormal blastocyst formation, and pronounced fetal growth retardation. DNA methylation is a reversible and heritable epigenetic modification that causes repression of gene expression. We hypothesized that global DNA methylation of the maternal genome is acquired during oocyte growth in the adult animal and that superovulation changes the normal acquisition of global acquisition of this epigenetic mark.

In our study, we determined the progression of global DNA methylation during oocyte growth in naturally cycling animals (NO; control) and then compared this to methylation levels of oocytes from females undergoing a SO scheme. Our results show that acquisition of DNA methylation is size-dependent and that it continues to be acquired in full grown oocytes in NO group. On the other hand, SO full-grown oocytes do not attain complete DNA methylation before ovulation and this may in part be responsible for genetic disorders and the lower developmental competence observed in embryos produced from SO oocytes.