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H3K27me3 may be associated with Oct4 and Sox2 in mouse preimplantation embryos

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ABSTRACT. As a core member of polycomb repressive complex 2, the transcription and enzyme activity of enhancer of zeste homolog 2 (Ezh2) is directly involved in the trimethylation of lysine 27 on histone H3. In this study, the fluorescence intensity of H3K27me3 in mouse *in vivo* morulae and blastocysts was compared by indirect immunofluorescence staining. We found that demethylation of H3K27me3 occurred during the blastocyst stage. Real-time polymerase chain reaction was performed to investigate *Ezh2* expression in oocytes and in preimplantation embryos. *Ezh2* expression peaked during the zygote stage and gradually decreased from the 2-cell stage, exhibiting an inverse pattern when compared with *Oct4* and *Sox2* mRNA in mouse preimplantation embryos. To understand the role of development-related genes on the transcription of mouse *Ezh2*, a promoter assay was performed in NIH/3T3 cells. *Ezh2* expression was markedly suppressed by Oct4 and Sox2 alone in a dose-dependent manner, while Ezh2 promoter activity in co-transfection with Nanog, Klf-4, and c-Myc groups showed no significant change as compared with the control.

Our data suggest that the demethylation of H3K27me3 is caused by the degressive expression and activity of *Ezh2* in blastocysts, leading to increased expression of developmentally important transcription factors. We also observed negative effects of Oct4 and Sox2 on the transcription of *Ezh2* and identified Oct4 and Sox2 as novel negative regulators of Ezh2 at the post-translation level in a mouse preimplantation embryo.

Key words: *Ezh2*; Development-related genes; Mouse; Transcriptional regulation; Trimethylation of H3K27

