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Organization of chromatin in the preimplantation mouse embryo

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Along with large-scale changes of gene activity and embryonic transcription in the preimplantation period of mammalian development, it has been shown that chromatin is chemically modified in a large-scale and stage-specific manner. Whether or not large-scale alteration of the ultrastructure of chromatin accompanies transcription programs or precedes them is not known and has not been directly observed. In this study, using correlative light and electron spectroscopic imaging (ESI) we demonstrate changes in the organization of chromatin fibers during development of the mouse preimplantation embryo, and provide the first evidence for a differential remodeling of chromatin structure. We describe chromatin structure of the preimplantation mouse embryo, which remodels between the two-cell embryo and the blastocyst. Chromatin in inner blastomeres of eight-cell and morula stages and epiblasts in the blastocyst stage is less condensed than in the outer blastomeres of eight-cell and morula stages, trophoblasts and extra-embryonic endoderm cells. In the later blastomeres, chromatin is organized into higher order structures around the nuclear envelope, nucleolus, and nucleoplasmic clumps. In addition, RNP compartments in these cells are more organized into discrete accumulations, whereas RNP compartments are more dispersed in the first group of cells. We propose that this differential chromatin and nuclear remodeling may provide the basis of the earliest differentiation events at the blastocyst stage.

Certificate of Participation

This is to certify that:

Hesam Dehghani

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