Pluripotency in 3D: genome organization in pluripotent cells.

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Public Summary:
Cells face the challenge of storing two meters of DNA in the three-dimensional (3D) space of the nucleus that spans only a few microns. The nuclear organization that is required to overcome this challenge must allow for the accessibility of the gene regulatory machinery to the DNA and, in the case of embryonic stem cells (ESCs), for the transcriptional and epigenetic changes that accompany differentiation. Recent technological advances have allowed for the mapping of genome organization at an unprecedented resolution and scale. These breakthroughs have led to a deluge of new data, and a sophisticated understanding of the relationship between gene regulation and 3D genome organization is beginning to form. In this review we summarize some of the recent findings illuminating the 3D structure of the eukaryotic genome, as well as the relationship between genome topology and function from the level of whole chromosomes to enhancer-promoter loops with a focus on features affecting genome organization in ESCs and changes in nuclear organization during differentiation.

Scientific Abstract:
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