Large scale chromosome folding is stable against local changes in chromatin structure

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Abstract:

In this journal club, I would introduce a recent research by A.Rosa et al. [1]. They considered a simple biophysical model of interphase chromosomes to be focused on the polymers constituted of fibers with different properties, in particular, to be assumed the different thickness of chromosome fiber (10 and/or 30 nm fiber). Using this model, the authors provided a quantitative description for many crucial aspects concerning the structure and dynamics of interphase chromosomes which are "spontaneously" driven by the physical properties.

The analysis in this paper has been investigated by focusing mainly on the following two properties : (1) mean-squared internal distance (measured through FISH)[2] and (2) average contact frequency (measured 3C techniques) [3]. These values are useful to distinguish between complementary aspects of chromosome conformation, as was highlighted by Ref.[4].

The authors claims that their results reflect a generic physical effect in more general systems of polymers constituted of fibers with different thickness and/or stiffness, and their model describes well the qualitative trend of the experimental data.

References:

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4. Williamson I, Berlivet S, Eskeland R, Boyle S, Illingworth RS, Paquette D, et al. Spatial genome organization: contrasting views from chromosome conformation capture and fluorescence in situ hybridization. Genes Dev. 2014, 28(24):2778-2791.