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# Colocalization of coregulated genes: A steered molecular dynamics study of Human Chromosome 19

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## Abstract

The observation that the concerted activity of certain groups of genes significantly correlates with their proximity in the nucleus [1] poses the general question of whether it is at all feasible to bring close together the numerous coregulated gene pairs on a chromosome. We tested this hypothesis by using steered molecular dynamics simulations of a coarse-grained (30nm) model for the gene-rich human chromosome 19. We enforced the colocalization of 1,500 pairs of genes, whose expression patterns over 20,000 microarray experiments are significantly correlated (coregulation).

Remarkably, we showed that the vast majority ( 82

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