

Chromosomal Contact Permits Transcription between Coregulated Genes

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Abstract

Transcription of coregulated genes occurs in the context of long-range chromosomal contacts that form multigene complexes. Such contacts and transcription are lost in knockout studies of transcription factors and structural chromatin proteins. To ask whether chromosomal contacts are required for cotranscription in multigene complexes, we devised a strategy using TALENs to cleave and disrupt gene loops in a well-characterized multigene complex. Monitoring this disruption using RNA FISH and immunofluorescence microscopy revealed that perturbing the site of contact had a direct effect on transcription of other interacting genes. Unexpectedly, this effect on cotranscription was hierarchical, with dominant and subordinate members of the multigene complex engaged in both intra- and interchromosomal contact. This observation reveals the profound influence of these chromosomal contacts on the transcription of coregulated genes in a multigene complex.