

Coming together: tDNAs, RNA pol III and chromatid cohesion

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In the September 1st issue of G&D, Drs. Rudra Dubey and Marc Gartenberg (UMDNJ) reveal a surprising new role for tDNAs and RNA polymerase III-associated proteins in sister chromatid cohesion.

Sister chromatid cohesion (the binding together of the two identical copies of each chromosome that are formed during replication) helps to ensure that chromosomes are accurately segregated during the anaphase of the cell cycle. Sister chromatid cohesion is mediated by a multi-subunit protein complex called cohesin. Inside the cell nucleus, cohesin localizes to centromeres (the point of attachment of sister chromatids) as well as heterochromatin (condensed and genetically inactive regions of DNA).

To investigate cohesion, Drs. Dubey and Gartenberg used yeast cells, where cohesin is found at the transcriptionally inactive HMR mating-type locus. The researchers determined that a tRNA gene adjacent to HMR (which actually serves as a boundary element to delimit the transcriptionally silenced area of the chromosome) as well as components of the RNA pol III machinery are all required for establishment of silent chromatin cohesion at HMR.

"Recent studies have pointed to roles for tDNAs and RNA pol III transcription factors in the spatial organization of chromosomes. We are excited by the prospect that these same elements govern yet another layer of chromosome architecture through the establishment of sister chromatid cohesion," explains Dr. Gartenberg.

Source: Cold Spring Harbor Laboratory

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