

Abstract

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Telomeric repeat containing RNA and RNA surveillance factors at mammalian chromosome ends.

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BACKGROUND: Telomeres, the DNA-protein complexes located at the end of linear eukaryotic chromosomes, are essential for chromosome stability. Until now, telomeres have been considered to be transcriptionally silent.

METHODS AND RESULTS: We demonstrate that mammalian telomeres are transcribed into telomeric repeat-containing RNA (TERRA). TERRA molecules are heterogeneous in length, are transcribed from several subtelomeric loci toward chromosome ends, and localize to telomeres. We also show that suppressors with morphogenetic defects in genitalia (SMG) proteins, which are effectors of nonsense-mediated messenger RNA decay, are enriched at telomeres in vivo, negatively regulate TERRA association with chromatin, and protect chromosome ends from telomere loss.

CONCLUSION: Thus, telomeres are actively transcribed into TERRA, and SMG factors represent a molecular link between TERRA regulation and the maintenance of telomere integrity.

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