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Cohesin complex oligomerization maintains end-tethering at dna double-strand breaks.

DNA double-strand breaks (DSBs) must be repaired to ensure genome stability. Crucially, DSB-ends must be kept together for timely repair. In Saccharomyces cerevisiae, two pathways mediate DSB end-tethering. One employs the Mre11–Rad50–Xrs2 (MRX) complex to physically bridge DSB-ends. Another requires the conversion of DSB-ends into single-strand DNA (ssDNA) by Exo1, but the bridging proteins are unknown. We uncover that cohesin, its loader and Smc5/6 act with Exo1 to tether DSB-ends. Remarkably, cohesin specifically impaired in oligomerization fails to tether DSB-ends, revealing a function for cohesin oligomerization. In addition to the known importance of sister chromatid cohesion, microscopy-based microfluidic experiments unveil a role for cohesin in repair by ensuring DSB end-tethering. Altogether, our findings demonstrate that oligomerization of cohesin prevents DSB end-separation and promotes DSB repair, revealing a previously undescribed mode of action and role for cohesin in safeguarding genome integrity.

Auteur principal: DUBRANA, karine (IRCM-CEA)

Orateur: DUBRANA, karine (IRCM-CEA)