Phosphorylation of cohesin by PLK1 at centromeres

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Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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Literature references

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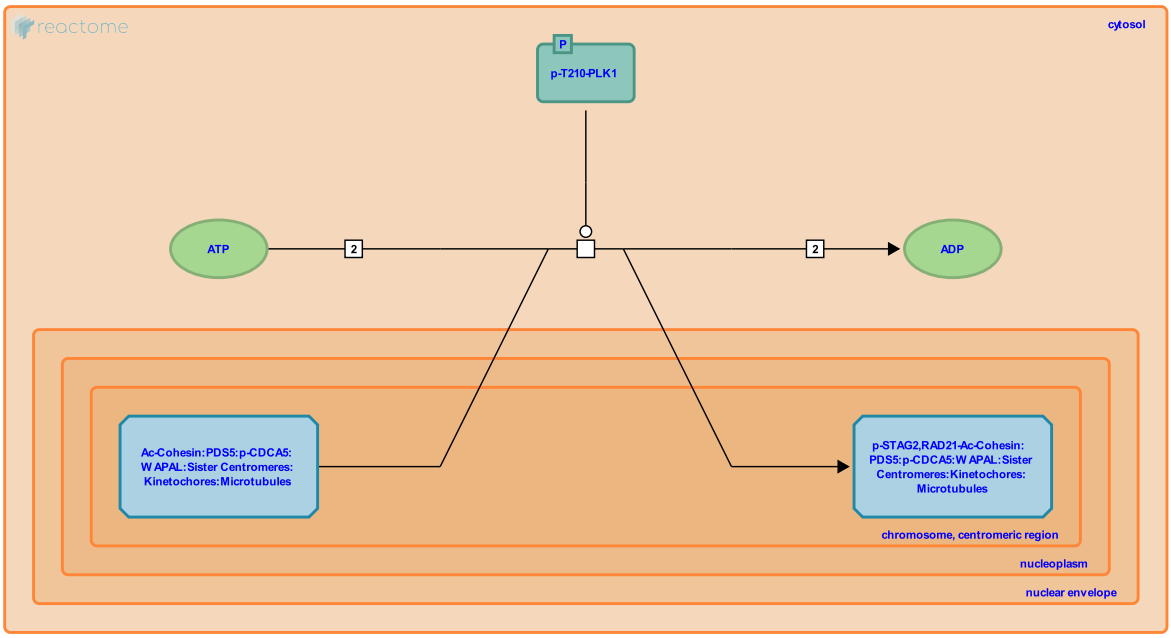
Stable identifier: R-HSA-1638803

Type: transition

Compartments: chromosome, centromeric region, cytosol



Prior to anaphase onset, sister-chromatids are held together by cohesin complexes distributed along chromosomal arms and at centromeres. In prometaphase, PLK1, likely recruited to cohesin complexes by binding to CDK1-phosphorylated CDCA5 (Sororin) (Zhang et al. 2011), phosphorylates cohesin subunits STAG2 (SA2) and RAD21 (Hauf et al. 2005). PLK1-mediated phosphorylation of cohesin subunits at centromeres is counteracted by the phosphatase activity of PP2A complex (containing the regulatory subunit B56 i.e. PPP2R5), which is recruited to the kinetochore by shugoshin proteins, SGOL1 and SGOL2 (Kitajima et al. 2006). Therefore, while cohesin complexes dissociate from chromosomal arms in prometaphase (Hauf et al. 2001), they remain bound to centromeres until anaphase onset (Hauf et al. 2001, Hauf et al. 2005, Kitajima et al. 2006). When separase is activated after its inhibitor securin is degraded by APC/C at the onset of anaphase, RAD21 is cleaved by separase. Phosphorylation of RAD21 by PLK1 facilitates subsequent cleavage of RAD21 by separase (Hauf et al. 2005). There are several potential PLK1 phosphorylation sites in STAG2 and RAD21, but the exact positions of in vivo phosphorylation of STAG2 and RAD21 by PLK1 have not been explicitly established (Hauf et al. 2005).

Literature references

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Editions

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