

CDK12 phosphorylates RNA Pol II CTD at DNA repair genes

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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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Reactome database release: 75

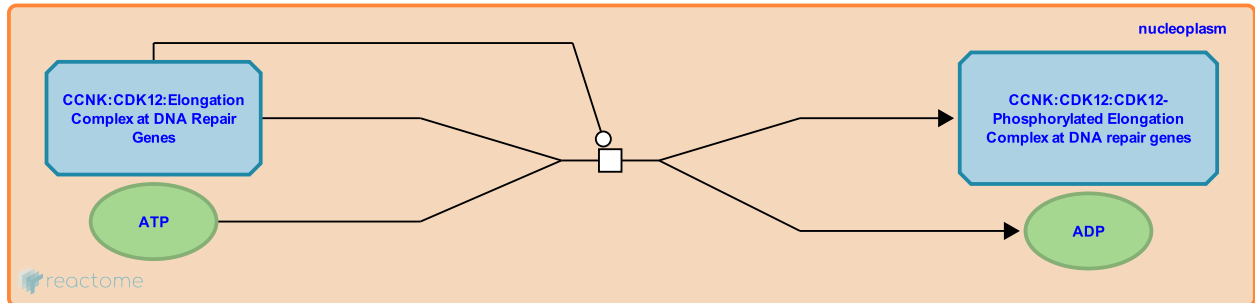
This document contains 1 reaction ([see Table of Contents](#))

CDK12 phosphorylates RNA Pol II CTD at DNA repair genes [↗](#)

Stable identifier: R-HSA-6797606

Type: transition

Compartments: nucleoplasm



CDK12, in complex with CCNK (cyclin K), phosphorylates heptapeptide repeats in the C-terminal domain (CTD) of the RNA polymerase II (RNA Pol II) subunit POLR2A. CDK12 may require phosphorylation of its threonine residue T893 to achieve full catalytic activity, but the activating kinase is not known. CDK12-mediated phosphorylation of the CTD of POLR2A occurs after the heptapeptide repeats in the CTD of POLR2A undergo phosphorylation by the CDK9-containing P-TEFb complex. It is unclear whether CDK12 acts on the second serine or the fifth serine or both in the YSPTSPS repeats. The mammalian POLR2A contains 52 heptapeptide repeats that start at amino acid position 1615. The exact localization of CDK9 and CDK12 target sites relative to the full-length POLR2A is not known. CDK12-mediated phosphorylation of the pre-phosphorylated RNA Pol II complex is important for the transcription of a group of genes with long and complex structures, involved in DNA repair (Blazek et al. 2011, Cheng et al. 2012, Bosken et al. 2014, Bartkowiak and Greenleaf 2015, Liang et al. 2015).

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Editions

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