CDCA5 (Sororin) enables cohesion of sister chromosomal arms

Gillespie, ME., Matthews, L., Orlic-Milacic, M., Tanno, Y., Watanabe, Y., Zhang, N.

European Bioinformatics Institute, New York University Langone Medical Center, Ontario Institute for Cancer Research, Oregon Health and Science University.

29/04/2024

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.

The development of Reactome is supported by grants from the US National Institutes of Health (P41 HG003751), University of Toronto (CFREF Medicine by Design), European Union (EU STRP, EMI-CD), and the European Molecular Biology Laboratory (EBI Industry program).

Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics, 33*, 3461-3467. ↗

Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

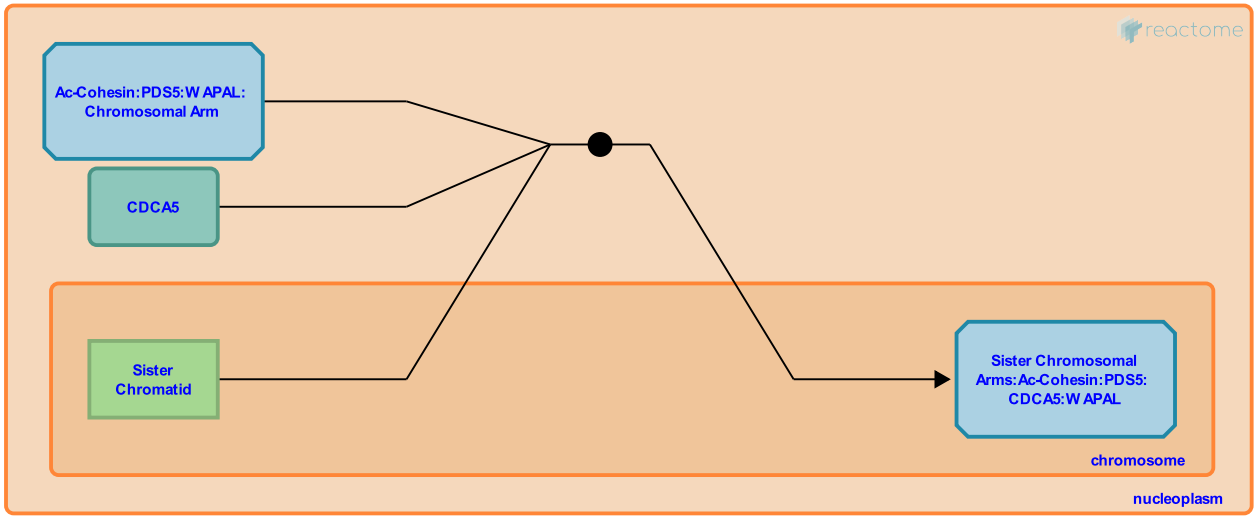
Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology, 14*, e1005968. ↗

CDCA5 (Sororin) enables cohesion of sister chromosomal arms ↗

Stable identifier: R-HSA-2468041

Type: binding

Compartments: nucleoplasm, chromosome



CDCA5 (Sororin) is essential for the establishment of sister chromatid cohesion in mammalian cells (Rankin et al. 2005) in the S-phase of the cell cycle (Nishiyama et al. 2010). Several factors contribute to the recruitment of CDCA5 to chromatin-associated cohesin: DNA replication (i.e. presence of two sister chromatids), association of cohesin complex with PDS5, and acetylation of the SMC3 cohesin subunit by ESCO1/ESCO2 acetyltransferases. Experiments in which a recombinant tagged mouse CDCA5 was expressed in human HeLa cell line showed that CDCA5 starts to accumulate on chromatin in S-phase and dissociates from chromosomal arms in prophase (Nishiyama et al. 2010).

CDCA5 is essential for the establishment of chromosomal cohesion only in the presence of WAPAL, suggesting that the key role of CDCA5 (Sororin) is to antagonize WAPAL. Both CDCA5 and WAPAL contain an FGF (phenylalanine-glycine-phenylalanine) motif that is essential for PDS5 binding and is also essential for CDCA5 function in cohesion establishment. Indeed, CDCA5 is able to displace WAPAL from PDS5:WAPAL heterodimers in vitro. In vivo experiments in Xenopus egg extracts suggest that CDCA5 rearranges the topology of cohesin associated proteins so that WAPAL is no longer able to inhibit sister chromatid cohesion but remains associated with cohesin (Nishiyama et al. 2010).

Literature references

Ayad, NG., Rankin, S., Kirschner, MW. (2005). Sororin, a substrate of the anaphase-promoting complex, is required for sister chromatid cohesion in vertebrates. *Mol. Cell, 18*, 185-200. ↗

Kreidl, E., Ladurner, R., Hyman, AA., Peters, JM., Bando, M., Mechtler, K. et al. (2010). Sororin mediates sister chromatid cohesion by antagonizing Wapl. *Cell, 143*, 737-49. ↗

Editions

2012-10-02	Authored	Orlic-Milacic, M.
2012-10-05	Edited	Gillespie, ME., Matthews, L.
2012-10-22	Reviewed	Zhang, N.
2012-11-20	Reviewed	Watanabe, Y., Tanno, Y.