reactome

Formation of the pre-incision complex in GG-NER

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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

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. ↗

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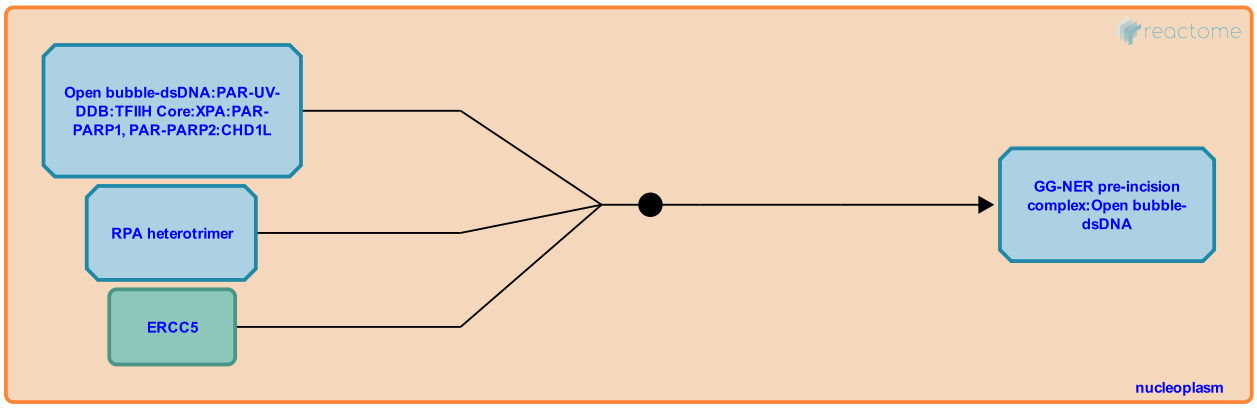
Stable identifier: R-HSA-5689317

Type: binding

Compartments: nucleoplasm



Once an open bubble structure is generated in damaged dsDNA through a DNA helicase activity of the TFIIH complex, the RPA heterotrimer composed of RPA1, RPA2 and RPA3, coats the undamaged single strand DNA (ssDNA) (de Laat et al. 1998), thereby protecting it from incision and enabling the correct positioning of the NER endonucleases. The interaction of RPA with XPA facilitates RPA recruitment to the global genome nucleotide excision repair (GG-NER) site (He et al. 1995, Ikegami et al. 1998). A DNA endonuclease ERCC5 (XPG) is recruited to the GG-NER site, 3' to the DNA damage, through its interaction with the TFIIH complex (Dunand-Sauthier et al. 2005, Zotter et al. 2006, Ito et al. 2007) and the RPA heterotrimer (de Laat et al. 1998).

Literature references

Ito, S., Kuraoka, I., Chymkowitch, P., Compe, E., Takedachi, A., Ishigami, C. et al. (2007). XPG stabilizes TFIIH, allowing transactivation of nuclear receptors: implications for Cockayne syndrome in XP-G/CS patients. *Mol. Cell, 26*, 231-43. ↗

Dunand-Sauthier, I., Hohl, M., Thorel, F., Jaquier-Gubler, P., Clarkson, SG., Schärer, OD. (2005). The spacer region of XPG mediates recruitment to nucleotide excision repair complexes and determines substrate specificity. *J. Biol. Chem., 280*, 7030-7. ↗

Ikegami, T., Kuraoka, I., Saijo, M., Kodo, N., Kyogoku, Y., Morikawa, K. et al. (1998). Solution structure of the DNA- and RPA-binding domain of the human repair factor XPA. *Nat. Struct. Biol., 5*, 701-6. ↗

Zotter, A., Luijsterburg, MS., Warmerdam, DO., Ibrahim, S., Nigg, A., van Cappellen, WA. et al. (2006). Recruitment of the nucleotide excision repair endonuclease XPG to sites of UV-induced dna damage depends on functional TFIIH. *Mol. Cell. Biol., 26*, 8868-79. ↗

He, Z., Henricksen, LA., Wold, MS., Ingles, CJ. (1995). RPA involvement in the damage-recognition and incision steps of nucleotide excision repair. *Nature, 374*, 566-9. ↗

Editions

2003-07-14	Authored	Joshi-Tope, G.
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