

29. Biochemical mechanisms of homologous recombination  
**1 unit, Scott Keeney, October 9, 2025**

DSBs are made by Spo11, a topoisomerase relative  
Homology search and strand exchange: RecA  
    DNA binding and filament formation  
    Strand exchange  
    Evolutionary conservation: Rad51 in eukaryotes  
Recombination mediators  
DNA end processing  
Holliday junction migration and resolution

Papers

[Discussion Paper:](#)

[Oger C and Claeys Bouuaert C \(2025\) SPO11 dimers are sufficient to catalyse DNA double-strand breaks in vitro](#)

*Additional papers can be found in Appendix I*

**Supplemental Papers: Appendix 1- Biochemical mechanisms of homologous recombination**

- Chen Z, Yang H, Pavletich NP. (2008) Mechanism of homologous recombination from the RecA-ssDNA/dsDNA structures. *Nature*. 453:489-4.
- Jensen RB, Carreira A, and Kowalczykowski SC (2010) Purified human BRCA2 stimulates RAD51-mediated recombination. *Nature* 467: 678-683
- Mimitou EP, Yamada S, and Keeney S (2017) A global view of meiotic double-strand break end resection. *Science* 355, 40-45.
- Crickard JB and Greene EC (2018) Biochemical attributes of mitotic and meiotic presynaptic complexes. *DNA Repair* 71: 148-157.
- Arter M, Hurtado-Nieves V, Oke A, Zhuge T, Wettstein R, Fung JC, Blanco MG, Matos J. (2018) Regulated Crossing-Over Requires Inactivation of Yen1/GEN1 Resolvase during Meiotic Prophase I. *Dev Cell*. 45:785-800.
- Cejka P and Symington LS (2021) DNA end resection: Mechanism and control. *Annual Rev. Genetics* 55: 285-307.
- Zheng Z, Zheng L, Arter M, Liu K, Yamada S, Ontoso D, Kim S, and Keeney S (2025) Reconstitution of SPO11-dependent double-strand break formation. *Nature* 639, 784-791.