

P024 Control of resection and recombination at Spo11 double-strand breaks

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DNA double-strand breaks (DSBs) with protein covalently attached to 5' strand termini are formed by Spo11 to initiate meiotic recombination. For the initiated events to be productive, Spo11 must be removed, the 5' ending strands resected, and the DSB ends coordinated; yet control of these processes has been unclear.

Spo11-DSBs are initially processed by endonucleolytic cleavage that releases Spo11 attached to a short oligonucleotide.

In wild-type cells, endonucleolytic processing and resection are concomitant with Spo11-DSB formation, indicating coordinated control of these three processes. The RecA-like recombinases, Rad51 and Dmc1, are loaded onto the single-stranded DNA flanking the break site, and catalyse DNA strand exchange with the homologous chromosome.

In a synchronous culture, the number of Spo11-oligonucleotide complexes is directly proportional to the amount of resected DSB-DNA. This finding is intriguing because, although Spo11-oligonucleotide complexes are expected to appear at the same rate as Spo11-DSB DNA, the disappearance of the two species is not necessarily expected to be coincident: Spo11-DSBs disappear upon conversion into strand exchange intermediates, whereas Spo11-oligonucleotide complexes presumably disappear upon degradation. We propose that Spo11-oligonucleotide complexes remain bound at the resected DSB end during the initial stages of DSB repair, influencing how the two sides of each DSB are coordinated.