No. 63

Investigation of the functional contribution of RecO to RecA activity

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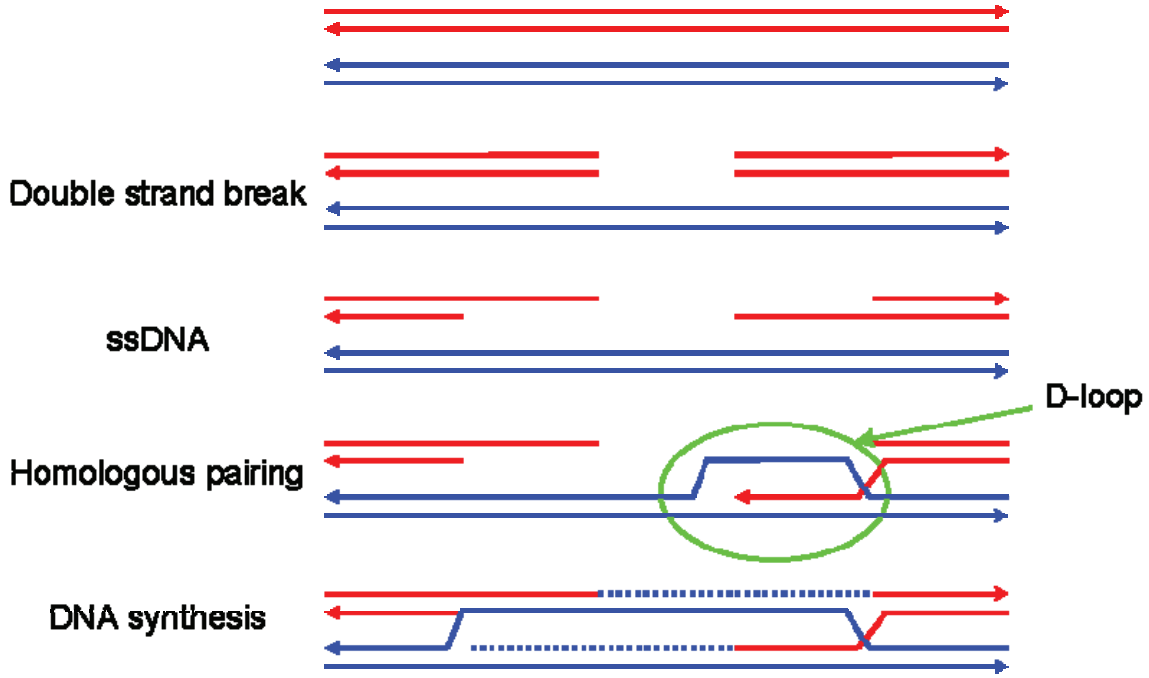
Homologous recombination plays an important role in generation of genomic diversity through sexual reproduction, and in the maintenance of genomic integrity through the repair of DNA double strand breaks and single-stranded gaps. Prokaryotic RecA and eukaryotic Rad51 plays a central role in homologous recombination by catalyzing ATP-dependent homologous pairing to form heteroduplex joints. The homologous pairing is initiated by the binding of a recombinase to single-strand DNA (ssDNA). However, ssDNA is protected by ssDNA binding proteins (SSB in prokaryotes, Replication protein A (RPA) in eukaryote) *in vivo*. Since ssDNA binding of recombinase is strongly inhibited by SSB/RPA, the subsequent processes are blocked. Recombination mediator is a protein that assists the binding of recombinase to SSB/RPA-coated ssDNA. In eukaryote, Rad52 and BRCA2 are recombination mediators. Rad52 and BRCA2 also stimulate functions of Rad51 such as homologous pairing activity *via* direct interaction even in the absence of RPA. In bacteria, RecF-RecO-RecR is known recombination mediator. Concerted action of RecF, RecO and RecR assist the filament formation of RecA on SSB-coated ssDNA. However, in contrast to eukaryotic recombination mediator, direct interaction with RecA and the stimulation of homologous pairing by RecF, RecO and RecR were not reported. It has been suggested that RecO or RecR interacts with RecA since RecO-RecR complex stabilizes the RecA nucleoprotein filament. Interestingly, like the case of Rad52 and BRCA2, RecO catalyzes homologous pairing in the absence of ATP. These facts suggested that RecO contributes homologous pairing directly and indirectly by assisting RecA, like the cases of Rad52 and BRCA2.

Thus, we study whether RecO stimulates the functions of RecA by a pull-down assay and a D-loop assay. Based on the results of this study, we discuss about rolls of RecO in ssDNA binding and homologous pairing by RecA.


Double strand break
ssDNA
D-loop
Homologous pairing
DNA synthesis