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Institute of Molecular Biology, Mainz

Dealing with DNA damage during replication

Complete and faithful duplication of its entire genetic material is one of the essential prerequisites for a proliferating cell to maintain genome stability. The cell has also to deal with DNA damages during replication which is called as DNA damage bypass therefore during replication DNA is particularly vulnerable to insults that can promote genomic instability. There are two major pathways that deal with the DNA damage during replication called: Trans-lesion synthesis which is highly error prone and could induce point mutations and the other is the template switching which is error free. Controlling the bypass of DNA lesions during replication is activated by ubiquitylation of the sliding clamp, PCNA. The monoubiquitylation of PCNA allows mutagenic translesion synthesis by damage-tolerant DNA polymerases, polyubiquitylation is required mainly for an error-free pathway that likely involves template switching.