Special Issue

Dynamics of DNA Double Strand Breaks

Message from the Guest Editor

A DNA double-strand break (DSB) is one of the most toxic lesions for a cell. Repair systems exist that aim at maintaining genomic integrity, including non-homologous end joining (NHEJ) and homologous recombination (HR). NHEJ roughly and quickly ligates two DNA double-strand ends. HR is a more sophisticated pathway. NHEJ and HR guarantee the integrity of the genome, but are also generators of genomic instability: both can lead to rearrangements eventually associated to mutagenesis at the junction. NHEJ between originally distant DNA ends leads to deletions, inversions, or translocations. HR between repeated sequences generates rearrangements. Avoiding these events is a keystone in the preservation of genomic integrity. In addition to HR and NHEJ, other DSB repair pathways exist that are necessarily mutagenic. They mostly rely on the use of microhomologies, which is quite a risky way to repair DSBs. Thus, the choices of the right pathway and the right partner are pivotal and are regulated by multiple safeguards, including the cell cycle phase, the chromatin context, and the nuclear compartment.

Guest Editor

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