Abstract

The progression of replication forks can be slowed down or paused by various external and internal factors during DNA replication. This phenomenon is referred to as replication stress and substantially contributes to genomic instability that is a hallmark of cancer. Transcription complex belongs to the internal replication-interfering factors and represents a barrier for progression of the replication complex. The replication forks are slowed down or paused while passing through the transcriptionally active regions of the genome that can lead to subsequent collapse of stalled forks and formation of DNA double-strand breaks, especially under conditions of increased replication stress. DNA helicase RECQ5 is significantly involved in maintenance of genomic stability during replication stress, but the mechanisms of its action are not clear. In this diploma theses, we have shown that RECQ5 helicase, in collaboration with BRCA1 protein, participates in the resolution of collisions between replication and transcription complexes. BRCA1 protein is a key factor in the homologous recombination process, which is essential for the restart of stalled replication forks. Furthermore, we have shown that RECQ5 helicase is involved in ubiquitination of PCNA protein at stalled replication forks.

Key words

DNA helicase RECQ5, replication stress, collision between replication and transcription complexes, BRCA1, ubiquitination of PCNA, replication restart