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RecX adopts a tandem repeats of three-helix bundle: Insights into RecX inhibition of RecA activities
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The bacterial RecA protein plays a key role in recombinational DNA repair in bacteria. It is a DNA-dependent ATPase that promotes DNA strand exchange reactions, and induces SOS response. However, the activities of RecA protein must be regulated in the cell to avoid aberrant DNA recombination. Currently, many additional proteins are known to regulate RecA function such as RecF, RecO, and RecD proteins. RecX protein is an inhibitor of RecA function both in vivo and in vitro. However, RecX protein is among the least understood of these RecA modulator proteins. But it has been found that RecX protein inhibits RecA protein ATPase, coprotease, and recombinase activity. Direct interaction between RecA and RecX has also been well demonstrated. Reconstituted RecA/RecX nucleoprotein filament from EM and RecA crystal structure show that RecX protein bind to the helical groove of RecA filament, spanning the monomer-monomer interface from the C-terminal domain of one RecA monomer to the core domain of the second. However, detailed RecX crystal structure is still unavailable until date. We have solved the first RecX crystal structure from Xanthomonas campestris to a resolution of 1.6 Å; crystallography. The tertiary structure of RecX indicates it adopts a novel three tandem repeats of three helix bundle. Enzyme assays indicate that RecX can efficiently inhibit the ATPase, coprotease, and recombinase activity of the RecA protein. A docking study of RecA dimer and RecX monomer reveals the tight interactions between these two proteins. Model study shows that RecX proteins can fit well into the major helical groove, with its C-terminus fitted into the notch between two adjacent RecA monomers in the RecA nucleofilament, as revealed by the cryoEM study.

Keywords: RecA, RecX, recombination

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Structure of Xcc UMPK/GTP complex reveals a novel GTP-binding site and allosteric mechansism
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Uridylate kinase (UMPK) is a key enzyme in pyrimidine biosynthesis. Due to its importance in nucleic acid biosynthesis, UMPK is ubiquitous in every living organism, including bacteria, archaea, and eukarya. However, UMPKs of bacterial origin are very different from the UMPKs of eukaryotic origin. In general, the eukaryotic enzymes have a broader substrate preference, exhibiting...