

PPRA Controls DNA Replication and Cell Growth in Escherichia Coli

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Abstract : PprA, a pleiotropic protein participating in radioresistance, has been reported for its roles in DNA replication initiation, genome segregation, cell division and DNA repair in polyextremophile *Deinococcus radiodurans*. Interestingly, expression of deinococcal PprA in *E. coli* suppresses its growth by reducing the number of colony forming units and provide better resistance against γ -radiation than control. We employed different biochemical and cell biology studies using PprA and its DNA binding/polymerization mutants (K133E & W183R) in *E. coli*. Cells expressing wild type PprA or its K133E mutant showed reduction in the amount of genomic DNA as well as chromosome copy number in comparison to W183R mutant of PprA and control cells, which suggests the role of PprA protein in regulation of DNA replication initiation in *E. coli*. Further, *E. coli* cells expressing PprA or its mutants exhibited different impact on cell morphology than control. Expression of PprA or K133E mutant displayed a significant increase in cell length upto 5 folds while W183R mutant showed cell length similar to uninduced control cells. We checked the interaction of deinococcal PprA and its mutants with *E. coli* DnaA using Bacterial two-hybrid system and co-immunoprecipitation. We observed a functional interaction of EcDnaA with PprA and K133E mutant but not with W183R mutant of PprA. Further, PprA or K133E mutant has suppressed the ATPase activity of EcDnaA but W183R mutant of PprA failed to do so. These observations suggested that PprA protein regulates DNA replication initiation and cell morphology of surrogate *E. coli*.

Keywords : DNA replication, radioresistance, protein-protein interaction, cell morphology, ATPase activity

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