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Ectopic Expression of Leishmanial DNA Polymerase β in *Escherichia coli* Confers Survival Advantage against Ultraviolet Radiation

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Abstract

Leishmania donovani encounters oxidative environment in the host macrophage and expected to have robust DNA repair mechanisms. Base Excision Repair (BER), a predominant repair pathway in *L. donovani* remains unexplored. Presence of mitochondria in eukaryotes has been projected as a symbiotic relationship since long and the role of DNA polymerase β in repair of mitochondrial DNA has gained importance in recent past. We ectopically expressed Leishmania DNA polymerase β (*Ld*Polβ) under inducible promoter in *E. coli* and found it is biologically active in vitro by using pUC19 as substrate. Further we checked its effect on sensitivity of *E. coli* to UV rays. We find that heterologous *Ld*Polβ slows down the growth of *E. coli* and surprisingly, could protect it from lethal effects of UV to a large extent. Co-expression of leishmania DNA Ligase IIIα (*Ld*LigIIIα) has a synergistic effect on survival advantage offered by *Ld*Polβ. Survival advantage given *Ld*Polβ in *E. coli* is reconfirmed by FACS analysis. Our observations indicate that *Ld*Polβ is crucial for handling ROS induced toxicity inside the mitochondria of the parasite and for its survival inside host macrophage. This studied may lead to explore for finding of the importance of *Ld*Polβ in survival against DNA damaging agents in *L. donovani* and its role in pathogenesis of leishmaniasis, it would help to discover new target and development of newer drug against Leishmaniasis.

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