Synthesis of N^2-furfuryl-dG adduct bearing DNAs and X-ray structure with *E. coli* translesion polymerase DinB

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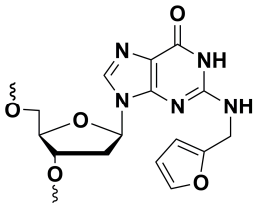
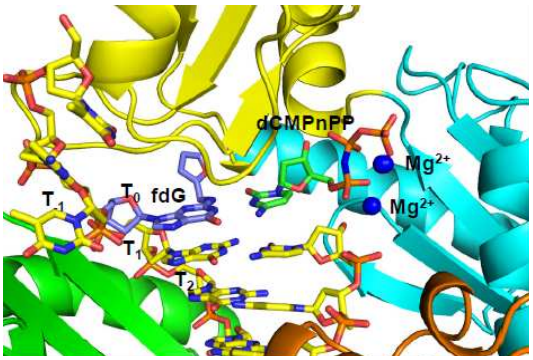
DNA replication takes place in cells employing replicative polymerase enzymes. DNA contains multiple reactive sites, which are vulnerable for attack by various external agents to form adducts or damages in DNA. These DNA damages creates block in replication process since replicative polymerases stalls at the damaged site. Translesional polymerases (Y-family) are low fidelity polymerases, which can incorporate the correct nucleotide against damaged nucleotide and then bypass the damaged site. Our aim was to get the clear perspective about conformational changes induced by the N^2-furfuryl-dG (fdG) modification, a naturally occurring damage, in *E. coli* translesion polymerase DinB. We have synthesized of fdG phosphoramidite and successfully incorporated into oligo DNAs by solid phase synthesis. Primer extension studies showed that DinB selectively incorporates the dCTP against the fdG adduct. We have obtained the X-ray crystal structures (2.18 - 2.7Å resolution) of three modified DNA-DinB complexes with incoming nucleotide. It was evident that the active site of DinB polymerase was preconfigured to accommodate the fdG adduct and incorporate the correct dCTP without affecting the base pairing.



DNA containing N^2-furfuryl-dG modification (fdG)



X-ray snapshot of complex of DinB-fdG DNA with incoming dCTP in the incorporation mode

Reference

(1) Jarosz, D. F.; Godoy, V. G.; Delaney, J. C.; Essigmann, J. M.; Walker, G. C. *Nature* **2006**, *439*, 225–228
(2) Sharma, A.; Kottur, J.; Narayanan, N.; Nair, D. T. *Nucleic Acids Res.***2013**, (Manuscript accepted)