Eukaryotic Translesion Synthesis DNA Polymerases: Structure and Function

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Cellular DNA is continually damaged by external and internal agents, and both eukaryotes and prokaryotes possess DNA polymerases that can replicate through DNA lesions. Humans have four such (Y-family) polymerases – Polκ, Polι, Polη, and Rev1 – each with a unique DNA damage bypass and fidelity profile. Polη, for example, is unique in its ability to replicate through UV-induced cyclobutane pyrimidine dimers (CPDs), while Polκ is inefficient at replicating through a T-T dimer but can readily extend from mispaired termini. Polι is perhaps the most unusual with varied efficiencies and fidelities opposite different template bases. I will present our structural work on these eukaryotic DNA repair polymerases, with an emphasis on the basis of their specialization in lesion bypass.

Keywords: DNA-polymerase, DNA-repair, replication