Characterizing UvrD helicase in Thermus aquaticus

Helicases are a class of enzymes essential for cell processes involving DNA, as their primary purpose is to unwind dsDNA. UvrD helicases repair replication errors through the DNA mismatch repair (MMR) pathway, which is critical for maintaining genomic stability. However, the role of UvrD helicase and much of the MMR pathway in eukaryotes is unknown. Thermus aquaticus was studied as it is a thermostable hybrid between E. coli and eukaryotic systems. To better understand the UvrD helicase, we characterize it as a function of dsDNA unwound, real-time DNA separation, and energy consumption via the use of native gels, FRET, and ATPase assays. Herein, we show that out of five DNA substrates, T. aquaticus UvrD helicase most efficiently unwinds DNA with a 3,5′ single stranded overhang. Results shown are fundamental for future research regarding the development of treatments for colorectal cancer, a disease caused by defects within the MMR pathway.