Characterization of the Helicase Activity of *Taq* UvrD

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Defects in DNA mismatch repair (MMR) have been implicated in many diseases and cancers, making therapies for MMR defects highly desirable. However, current gaps in the mechanistic understanding of the eukaryotic MMR pathway present an obstacle to their development. The well-characterized *E. coli* UvrD helicase has been shown to be necessary for DNA repair via its role in unwinding nascent DNA strands following MutH nicking to allow for exonucleolytic digestion. However, eukaryotic MMR systems lack MutH or a MutH-homolog, making the role of helicases unclear. To overcome challenges of characterizing eukaryotic MMR proteins, we have identified *Thermus aquaticus* (*Taq*) as a hybrid between eukaryotic and *E. coli* MMR systems. In this project, *Taq* UvrD was purified and characterized through a series of native PAGE helicase, FRET, and ATPase assays. From these assays, we concluded that *Taq* UvrD is an effective helicase protein, and that its functionality is greater at higher temperatures. This indicates that in systems lacking a MutH homolog, the unwinding of double-stranded DNA is still key to effective mismatch repair. This gives direction to future projects, in which we will obtain additional kinetic information about *Taq* UvrD function and subsequently understand the eukaryotic MMR pathway more completely.