Abstract Submitted
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Single Molecule Measurements of Protelomerase TelK-DNA Complexes[1] MARKITA LANDRY, Graduate Student, RUSTEM KHAFIZOV, Co-author, WAI MUN HUANG, Collaborator, YANN CHEMLA, Primary Investigator, PROTEIN SAMPLES COLLABORATION — Protein-DNA interactions lie at the heart of many essential cellular processes such as replication, recombination, and repair. Recent advances in optical "tweezers" have made it possible to resolve motions on the scale of a single base pair of DNA, 3.4Å. High-resolution optical traps have the potential to reveal these interactions at their fundamental length scales and should reveal how certain proteins bind to DNA or recognize target sequences. Telomerases are enzymes that have been actively studied in various organisms because of their fundamental involvement with both cancer and aging[1]. Protelomerase TelK is an enzyme responsible for forming closed DNA hairpin ends in linear DNA. TelK is not an ATP dependant enzyme, which is surprising given the degree of DNA distortion accomplished by the enzyme, and the large energy barrier intrinsic in DNA hairpin formation. Therefore, our focus is on TelK mutants lacking their c-terminal domain, and TelK YF mutants lacking their tyrosine active site amino acid. Preliminary data have shown remarkable differences in protein binding and unbinding forces caused by the removal of a single oxygen atom from a 73 kDa protein. Further measurements using high-resolution optical tweezers should provide fundamental insights into the nature and importance of the electrostatic interactions between TelK and its DNA substrate. 1. Shay, J. et al. *Rad. Res.* **155**, 188 (2001) [1] Huang, W. et al. *Mol. Cell.* **27**, 901 (2007).

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