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**Single Molecule Measurements of Protelomerase
TelK-DNA Complexes¹**

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LABORATION — Protein-DNA interactions lie at the heart of many
essential cellular processes such as replication, recombination, and re-
pair. 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 aging¹. 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 unbind-
ing 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).

Prefer Oral Session

Prefer Poster Session

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