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Repetitive DNA unwinding mode of the *HIM-6* RecQ helicase

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Bloom's syndrome (BS) is caused by mutations in the BLM gene encoding the BLM helicase. The BLM protein contains a conserved RecQ helicase domain and unwinds various DNA substrates including replication forks. Cells from BS patients lack the BLM protein show defects in the response to replicative stress and contain a multitude of chromosomal aberrations. A BLM homolog (*HIM-6*) has been identified in *C. elegans* based on its close homology to human BLM. Here, we used single-molecule FRET technology to observe DNA unwinding in real time. Our results show that the *HIM-6* repetitively unwound a long forked DNA depending on ATP concentration and resolved flap and D-loop DNA, all of which are intermediates in DNA repair. Also, we found that *HIM-6* unwound at most 25 base pairs of duplex DNA in a speed of 28 nucleotides per second before returning. Besides, repetitive unwinding mode of *HIM-6* was changed to unidirectional unwinding in the presence of RPA, indicating that its unwinding mode can be modulated by partner proteins *in vivo*. This study can be used to search proteins which would modulate a *HIM-6* unwinding mode on different DNA structures such as Holliday junction and G4-quadruplex.

Biography

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