LAUFER CENTER
FOR PHYSICAL AND QUANTITATIVE BIOLOGY

Seminar 2016

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"How do helicases Unwind DNA?"

Escherichia coli RecBCD is a DNA helicase/nuclease that functions in double-stranded DNA break repair. RecBCD possesses two motors (RecB, a 3´ to 5´ translocase, and RecD, a 5´ to 3´ translocase). Current structural models for how DNA helicases unwind duplex DNA propose that motor translocation is tightly coupled to base pair (bp) melting. However, biochemical evidence suggests that DNA melting of multiple bp may occur separately from single stranded DNA translocation. To test this hypothesis, we designed DNA substrates containing reverse backbone polarity (RP) linkages that prevent ssDNA translocation of the canonical RecB and RecD translocase motors. Surprisingly, we find that RecBCD can processively unwind DNA for at least 80 bp beyond the RP linkages. This ability requires an ATPase active RecB motor, the RecB "arm" domain and also the RecB nuclease domain, but not its nuclease activity. These results indicate that RecBCD can unwind duplex DNA processively in the absence of ssDNA translocation by the canonical motors and that the nuclease domain regulates the helicase activity of RecBCD.

Friday November 4, 2016

1:30 PM

Laufer Center Lecture Hall 101

Hosts: Ken Dill & Jason Wagoner

Stony Brook University

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