GUEST SEMINAR

Characterizing the Transcription Elongation Dynamics of RNA Polymerase II at the Single-molecule Level

By

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Date: 12 March 2014 (Wed)
Time: 2:00pm
Venue: LTH

Abstract

Transcription of DNA by RNA Polymerase II (Pol II), being the first step in producing proteins that are critical to the survival of the cell, represents a common target for regulating gene expression. Despite many years of intense study, there remain many unresolved questions regarding the physical mechanisms underlying eukaryotic transcriptional regulation. Often, as in the case of epigenetic transcriptional silencing, transcriptional repression of Pol II is mediated through the nucleosome (the histone-DNA complex forming the basic repeating unit of chromatin). It is now well-established that nucleosomes repress Pol II activity by taking advantage of pauses that are inherent to the elongation dynamics of Pol II.

We used a dual-trap optical tweezers instrument to quantitatively describe real-time transcription elongation dynamics. Here, I will discuss how the histone tails and the specific histone-DNA contacts contribute to the strength of the mechanical barrier posed by the nucleosome during transcription elongation by Pol II. I will also present evidence that the secondary structure of the RNA transcript can modulate the tendency for Pol II to backtrack, and in turn, bias the passage of Pol II through nucleosome. Furthermore, I will also talk how the transcription factor IIF and IIS modulate transcription elongation. These findings shed light on the mechanistic details underlying the control of gene expression by chromatin remodeling and transcription factors.

ALL ARE WELCOME