Structural Basis of Eukaryotic Transcription-Coupled Lesion Recognition

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Progression of RNA polymerase II (Pol II) elongation along the DNA template strand can be blocked by a number of obstructions, including covalent DNA lesions, non-canonical DNA structures, and small molecules or proteins bound to the DNA. These arrested transcriptional complexes, if not resolved in a timely manner, can be harmful to the cell and increase the risk of genomic instability.

Eukaryotic transcription-coupled DNA repair is an important sub-pathway of nucleotide excision repair that preferentially removes DNA lesions from the template strand that block Pol II translocation. This process is initiated by Pol II arrested by DNA lesion and the recruitment of Cockayne Syndrome B protein (CSB) to the lesion-arrested Pol II. However, the function and molecular mechanism of transcription-coupled repair initiation have remained elusive. Here we report our recent structural and functional studies of lesion-arrested Pol II and Pol II-CSB complex. These structures provide important structural insights of how DNA lesions are recognized during transcription and the key roles of CSB in both transcription-coupled repair and transcription elongation.

References

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