SERINE PHOSPHORYLATION AND PROLINE ISOMERIZATION IN RNAP II CTD CONTROL RECRUITMENT OF NRD1

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ABSTRACT

The C-terminal domain (CTD) of RNA polymerase II (RNAP II) consists of tandem repeats of the consensus sequence Tyr1-Ser2-Pro3-Thr4-Ser5-Pro6-Ser7.C-terminal domain (CTD), servesas a binding platform for the recruitment of cofactors involved in transcription and processing of RNA.The recruitment of cofactors is controlled by post-translational modifications of the CTD. Nrd1–Nab3–Sen1 (Nrd1) complex plays a central role in termination of RNAPII transcription of non-coding (nc)RNAs. A previous study demonstrated that in Saccharomyces cerevisiaeNrd1 complex binds to Ser5 phosphorylated (pSer5) CTD through CTD interacting domain (CID) of Nrd1 protein.To understand how the pSer5 CTD of RNAPII is recognized by Nrd1,we solved the solution structure of the pSer5 CTD bound to Nrd1. The structure reveals a direct recognition of pSer5 by Nrd1 that requires the cis conformation of the upstream pSer5–Pro6 peptidyl-prolyl bond of the CTD. Mutations at the complex interface diminish binding affinity and impair processing or degradation of noncoding RNAs. These findings underpin the interplay between covalent and noncovalent changes in the CTD structure that constitute the CTD code.

Key words: RNA, transcription, transcription termination, Nrd1, CTD

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