

Insight into RNA Polymerase III specific-subunit structure

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The 17-subunit human RNA polymerase III (hPol III) transcribes small, untranslated RNA genes that are involved in the regulation of transcription, splicing and translation. hPol III subunits hRPC62, hRPC39 and hRPC32 form a stable ternary subcomplex required for promoter-specific transcription initiation by hPol III. Here, we report the crystal structure of hRPC62. This subunit folds as a four-tandem extended winged helix (eWH) protein that is structurally related to the transcription factor TFIIE α N terminus. Through biochemical analyses, we mapped the protein-protein interactions of hRPC62, hRPC32 and hRPC39. In addition, we demonstrated that hRPC62 and hRPC39 bind single-stranded and duplex DNA, respectively, in a sequence-independent manner. Overall, we shed light on structural similarities between the hPol III-specific subunit hRPC62 and TFIIE α and propose specific functions for hRPC39 and hRPC62 in transcription initiation by hPol III.