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Title: Relationship Between H2AZ, H3K4me3, and KDM5B Correlates with Transcriptional Directionality

Abstract

Bidirectional transcription initiates pervasively genome-wide at CpG island (CGI) promoters and at enhancers, but at promoters proceeds into productive elongation only in the sense direction. In contrast, enhancer transcription and antisense promoter transcription terminate early. Complicating the study of transcription, many genes have alternate start sites used only in a fraction of cell types. Pro-seq nascent transcriptional data can be used to infer the TSS position and the directionality of CGI transcription in a given cell type. Comparing this transcriptional data to enrichment of two common CGI promoter marks, H2AZ and H3K4me3, and the H3K4me3 demethylase KDM5B, revealed that H2AZ and KDM5B were typically located upstream of the TSS, while H3K4me3 was offset downstream of the TSS. Taken together, these data suggest a relationship between H3K4me3, H2AZ, and KDM5B placement and direction of transcription. This placement may contribute to the restriction of antisense transcription, or alternatively, to encourage sense transcription.