

Inner nuclear membrane proteins and chromatin organization

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ABSTRACT

Chromatin exists in two flavors euchromatin and heterochromatin. Heterochromatin in the fission yeast *Schizosaccharomyces pombe* is clustered at the nuclear periphery and interacts with a number of nuclear membrane proteins. However, the significance and the factors that sequester heterochromatin at the nuclear periphery are not fully known. Here, we report that an inner nuclear membrane protein complex Lem2-Nur1 is essential for heterochromatin mediated gene silencing. We found that Lem2 is physically associated with another inner nuclear membrane protein, Nur1, and deletion of either *lem2* or *nur1* causes silencing defect at centromeres, telomeres, and rDNA loci. We analyzed the genome-wide association of Lem2 using ChIP sequencing and we found that it binds to the central core region of centromeres, in striking contrast to Chp1, a component of pericentromeric heterochromatin, which binds H3K9me-rich chromatin in neighboring sequences. The recruitment of Lem2 and Nur1 to silent regions of the genome is dependent on H3K9 methyltransferase, Clr4. Finally, we show that the Lem2-Nur1 complex regulates the local balance between the underln]Snf2/HDAC-containing repressor complex (SHREC) histone deacetylase complex and the anti-silencing protein Epe1. These findings uncover a novel role for Lem2-Nur1 as a key functional link between localization at the nuclear periphery and heterochromatin-mediated gene silencing.

Key Words: Lem2; Nur1, Chromatin, gene silencing, heterochromatin; histone modification; nuclear envelope.