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Gene silencing and Nuclear Membrane

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ABSTRACT

The long DNA molecule within Eukaryotic cell is condensed with the help of histone proteins that form the nucleosome. The chromatin is not a static molecule it needs to regulate the different topological states and execute different functions. The chromatins within the cell exist as euchromatin and Heterochromatin. Heterochromatin in the fission yeast Schizosaccharomyces pombe is clustered at the nuclear periphery and the factors that sequester heterochromatin at the nuclear periphery are not fully known. Here, we report that Protein –Protein interaction (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 causes silencing defect at centromeres, telomeres and at rDNA loci. We analyzed the genome-wide association of Lem2 using ChIP-seq and 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 genome is dependent on H3K9 methyltransferases, Clr4. Finally, we show that Lem2-Nur1 complex regulates the local balance between the 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: ***Heterochromatin, Euchromatin, Lem2, Nur1,Silencing..***