

Transcriptional Regulation by Histone Modifications using Yeast Model

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Extended Abstract

Introduction:

The methylation of the fourth lysine on histone H3 (H3K4me) is a well-known mark of transcription activation and the ubiquitination of the 123rd lysine of on histone H2B monoubiquitination (H2Bub1) is the prerequisite for H3K4 me in *Saccharomyces cerevisiae*. All three types of H3K4 methylation, including mono, di and tri-methylation, occur by sole H3K4 methyltransferase, Set1 in *S. cerevisiae*. We created the strain defective bulk level of H3K4me₃ even when H2Bub1 signal is normal without any mutation of proteins. We found that some oxidation reduction related genes are less expressed in H3K4me₃ defective strain comparing the strains bearing normal level of H3K4me₃ by RNA-sequence analysis. Also, *Candida albicans*, which is the most common fungal pathogen in human has Set1 complex as its methyltransferase for the H3K4. It is previously described that Set1 deleted mutant shows attenuated virulence and pathogenesis in *C. albicans*. However, it is unclear why Set1 is important for virulence of *C. albicans*. In this study, we performed RNA sequencing of wild type and Δ set1 strain to identify the role of Set1 in *C. albicans* pathogenesis. In Δ set1, the 156 genes are down regulated more than 2-fold.

Conclusion:

The Gene Ontology (GO) enrichment analysis revealed that the significant number of these genes has oxidoreductase activity. Indeed, the Δ set1 strain is more sensitive to hydrogen peroxide or menadione which induces oxidative stress. The survival assay in macrophages indicated that the survival rate of Δ set1 in macrophages is less than wild type strain. These results show that the Set1 is required for the survival in host cells by regulating the expression of genes whose products defend against an oxidative stress.

Recent Publications: 1. Kim J, Lee J E and Lee J S (2015) Histone deacetylase-mediated morphological transition in *Candida albicans*. *Journal of Microbiology* 53(12):805-811 2. Lee J E, Oh J H, Ku M, Kim J, Lee J S and Kang S O (2015) Ssn6 has dual roles in *Candida albicans* filament development through the interaction with Rpd31. *FEBS Letters* 589(4):513-520. 3. Lee J S, Garrett A, Yen K, Takahashi Y H, Hu D, Jackson J, Seidel C, Pugh B F and Shilatifard A (2012) Co-dependency of H2B monoubiquitination and nucleosome re-assembly on Chd1. *Genes and Development* 26(9):914-919. 4. Lee J S, Smith E and Shilatifard A (2010) The language of histone crosstalk. *Cell* 142(5):682-685. 5. Lee J S, Shukla A, Schneider J, Floresn L, Swanson S K, Washburn M P, Bhaumik S R, and Shilatifard A (2007) Histone crosstalk between H2B monoubiquitination and H3 methylation mediated by COMPASS. *Cell* 131(6):1084-1096.

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