

Abstract:

Polycomb Repressive Complex 2 is a multi-subunit complex that deposits mono- di- and tri- methyl groups on lysine 27 of histone H3, and tri-methyl H3K27 is a molecular marker of transcriptionally repressed facultative heterochromatin. Polycomb mediated silencing is important for development in metazoans and for repression of key fungal genes in certain filamentous fungi. *Neurospora crassa* and *Magnaporthe oryzae* contain minimal Polycomb repression systems which allow for genetic studies to examine the basic mechanisms of this complex in addition to its biological impact. This body of work shows Polycomb mediated repression of known effector genes in *M. oryzae*, and deletion of the H3K27 methyltransferase, KMT6, derepressed many effector genes in addition to reducing virulence of this devastating plant pathogen. In *N. crassa*, deletion of the histone variant H2A.Z downregulates the expression of a critical subunit of Polycomb Repressive Complex 2 and results in region-specific loss of H3K27 methylation. These discoveries are important in understanding how the plant pathogen *M. oryzae* regulates the genes related to infection of a host plant. Additionally, work in *N. crassa* has revealed that differential dependence on EED concentration is more critical for establishment or maintenance of specific repressed domains in the genome. This work represents meaningful contributions to understanding the function and control of facultative heterochromatin in filamentous fungi.