Role of Histone Modifications in Meiosis

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Recommended Citation
Allen, Mason and Joshi, Neeraj, "Role of Histone Modifications in Meiosis" (2012). Undergraduate Research Posters 2012. 43.
https://engagedscholarship.csuohio.edu/u_poster_2012/43
Role of histone modifications in meiosis
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Abstract

Meiosis I is characterized by events taking place between homologous chromosomes called crossing over in which double stand breaks (DSB) are formed and repaired using the homologous chromosome as a template. This ensures genetic diversity and is an important part of gamete viability. DSBs can be repaired using two different templates one being the homologous chromosome while the other is the associated sister chromatid. Repair using the sister chromatid is not favored in meiosis (unlike mitosis). Completion of meiotic DSB repair is controlled by a series of checkpoints that prevent meiotic progression when recombination is defective. Previously, two genes have been identified as important meiotic checkpoints, Gene A and Gene B. The functions of Gene B were identified and the hypothesis is that Gene A must share similar functions prompting the question what is the role of Gene A in meiotic double strand break repair? Research done with S. cerevisiae (budding yeast) showed that Gene B had no effect on wild-type spore viability as a single mutant but when combined with mutant Gene C resulted in a drastic decrease in spore viability. This was thought to show that these two genes operate on two parallel paths to control DSB repair in chromosome segregation, with one taking over when the other one was non-functioning. To see if Gene A shared the same role as Gene B, double mutants were created to test chromosome segregation and DSB repair as compared with Gene B deletions. The spore viability of double mutants and their potential implications will be discussed.