Stony Brook University
The Graduate School

Doctoral Defense Announcement

Abstract

The meiotic recombination checkpoint coordinates the transition between interhomolog recombination and intersister double strand break repair during prophase I in *Saccharomyces cerevisiae*

By

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Meiosis is a specialized cell division where the chromosome number of a progenitor cell is halved by producing four haploid gametes, each inheriting one copy of each unique chromosome. In sexual reproduction, two gametes are fused together to restore the diploid chromosome number and pass genetic information onto the next generation for a species. Errors in chromosome segregation during meiosis result in infertility and genetic diseases in the offspring of most eukaryotes, including humans. Due to evolutionary conservation, the model organism *Saccharomyces cerevisiae*, or budding yeast, is an excellent tool for understanding how chromosomes faithfully segregate during meiosis. In both yeast and mammals, the faithful segregation of chromosomes during meiosis is dependent on genetic recombination between homologous chromosomes. This step must be completed before the cellular divisions begin to ensure faithful segregation. Therefore, the transition between meiotic recombination and chromosome segregation is highly regulated to ensure the proper sequence of events. The meiotic recombination checkpoint is a cell cycle checkpoint that monitors this transition. This work explores how the checkpoint also controls the transition from interhomolog recombination to intersister double strand break repair during prophase I. This study reveals (1) how checkpoints are particularly important when meiotic recombination is abnormal, (2) how the recombinases Rad51 and Dmc1 are regulated to maximize the efficiency of meiotic recombination while preventing residual double strand breaks, and (3) how the meiotic recombination checkpoint is inactivated to permit meiotic progression into the cellular divisions.

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