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Super-resolution Microscopy vs. Epifluorescent Microscopy of Aurora Kinase C and SYCP3 Localization in Mouse Oocytes and Spermatocytes

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Being able to more closely examine cells on the molecular level is becoming increasingly important to researchers in order to understand the complex pathways and interactions that occur during meiosis. Unveiling information about these interactions is extremely critical in order to eventually understand problems that occur during pregnancy and reproduction which will hopefully one day remedy long-lasting issues that often result in pregnancy loss and genetic mutations in surviving embryos. This experiment consists of the analysis of two chromatin remodeling proteins that are essential for proper chromosomal division to occur during meiosis. Aurora Kinase C is primarily localized at the centromeres of mouse oocytes, and Synaptonemal Complex Protein 3 (SYCP3) is localized along the cohesions between homologous chromosomes in the lateral position of each chromosome. This experiment will specifically be studying lymphoid specific helicase (LSH) wild type mouse oocytes and Trichostatin A-treated (TSA) mouse spermatocytes. Epifluorescent microscopy, a common method of imaging chromosomes, is used in this report. However, advances in technology have allowed super-resolution microscopy to yield higher-resolution imaging of chromosomes. Super-resolution microscopy will allow the observation of Aurora Kinase C and SYCP3 on a molecular level in the mouse germ cells with hopes of uncovering more information about the roles of both Aurora Kinase C and SYCP3 during meiosis. The primary goal of this report is to compare and contrast the two microscopy methods, epifluorescent microscopy and super-resolution microscopy, and discuss the relative strengths and weaknesses of using each microscopy method.

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