Role of Programmed Proteolysis During Meiosis

Vincent Matthews
Cleveland State University

G. Valentin Borner Ph.D.
Cleveland State University, G.BOERNER@csuohio.edu

Follow this and additional works at: https://engagedscholarship.csuohio.edu/u_poster_2013

Part of the Business Commons, Engineering Commons, History Commons, Life Sciences Commons, and the Physical Sciences and Mathematics Commons

How does access to this work benefit you? Let us know!

Recommended Citation
https://engagedscholarship.csuohio.edu/u_poster_2013/24

This Article is brought to you for free and open access by the Undergraduate Research Posters at EngagedScholarship@CSU. It has been accepted for inclusion in Undergraduate Research Posters 2013 by an authorized administrator of EngagedScholarship@CSU. For more information, please contact library.es@csuohio.edu.
Role of programmed proteolysis during meiosis

College of Sciences and Health Professions

Department of Biological, Geological & Environmental Sciences

Student Researcher: Vincent Matthews

Faculty Advisor: G. Valentin Börner, Ph.D.

Abstract

Meiosis is the process which forms gametes and spores for reproduction in eukaryotic cells. During the pachytene phase of meiosis I, a protein structure, called the Synaptonemal Complex (SC), forms between homologous chromosomes and creates a scaffold for genetic recombination. In yeast, the Zip1 protein is a major structural component of the SC. At restrictive temperature for meiosis, ZIP1 is required for completion of meiotic divisions. At permissive temperature ZIP1 is required for proper chromosome segregation. We observed that chemical inhibition of the proteasome, with MG132, results in arrest at prophase of meiosis I. Based on these results, we questioned whether there is a regulatory relationship between the SC and the proteasome. Our findings demonstrate the localization of the proteasome along the SC, consistent with proteolysis of SC proteins by the proteasome. Furthermore, lack of double-strand breaks, lack of SC and lack of recombination proteins, result in failed proteasome recruitment to chromosomes during meiosis I. This implies that the proteasome plays not only a role in proper meiotic division, but also double-strand break repair and chromosomal recombination. Fluorescent microscopy techniques were applied to determine the chromosomal localization of the proteasome. Epitope tagged recombination proteins (ZIP1, ZIP3 and MSH4) were utilized along with tagged proteasome components to determine the pattern of proteasome localization to meiotic chromosomes. This is significant as a clearer, fundamental understanding of the proteasome’s role in meiosis may serve to illuminate the causation of many birth-defects, miscarriages and stillbirths.