MBP1 Null Mutant Strains of Candida *albicans* Do Not Show Defects in Responding to Oxidative Stress

Staci Solin

Research Advisor: Dr. Daniel Herman

Department of Biology University of Wisconsin-Eau Claire, Eau Claire, WI 54702

Introduction

During an immune response the body's primary phagocytizing white blood cells, neutrophils, engulf antigens. The neutrophil then releases reactive oxygen species such as hydrogen peroxide that degrade the ingested antigen. Previous studies on S. *cerevisiae*, a typically non-pathogenic yeast, have demonstrated that the *MBP1* gene product interacts with the *SKN7* gene product to regulate a genetic response that induces resistance to oxidative stress. This study examined whether or not the *MBP1* gene product had a similar function in the yeast Candida *albicans*, the most frequently isolated fungal pathogen in humans.

This further characterization of the Mbp1 protein follows previous research in which the *MBP1* gene of C. *albicans* appeared to play a role in inducing morphogenesis under nitrogen-limiting conditions. Morphogenesis, the transition from a yeast to filamentous morphology, has been demonstrated to play an important role in the organism's ability to cause systemic disease in immuno-compromised patients.

Methods

The wild type, heterozygote , and null mutant strains were inoculated in YPD + ura media and grown overnight at 30° C. Sensitivity of the strains to oxidative stress was assessed by plating them on YPD agar containing either 1 mM t-butyl hydroperoxide or 3 mM hydrogen peroxide (H_2O_2). The plates were spotted with yeast cells of each strain at concentrations of 10^5 (left) to 10 (right) cells in a total volume of 5 ul. Growth occurred at 30° C for 72 hours.

Growth on 3 mM Hydrogen Peroxide

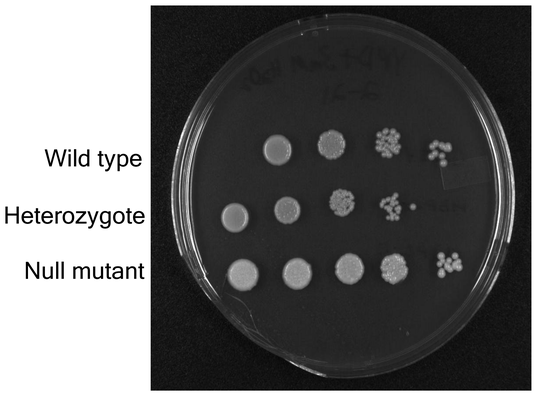

Figure 1. Growth of wild-type, heterozygote, and null mutant strains of C. *albicans* on YPD containing 3 mM hydrogen peroxide. Plates were spotted with yeast cells of each strain at concentrations of 10^5 (left) to 10 (right) cells in a total volume of 5 ul.

Growth on 1 mM t-butyl hydroperoxide

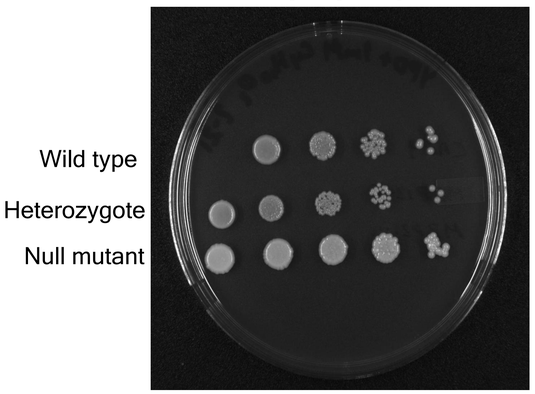

Figure 2. Growth of wild-type, heterozygote, and null mutant strains of C. *albicans* on YPD containing 3 mM hydrogen peroxide. Plates were spotted with yeast cells of each strain at concentrations of 10^5 (left) to 10 (right) cells in a total volume of 5 ul.

References

Singh, Praveen, Neeraj Chauhan, Anup Ghosh, Freddie Dixon, and Richard Calderone. "SKN7 of Candida *albicans*: Mutant Construction and Phenotype Analysis." Infection and Immunity 72 (2004): 2390-2394.

Results

Figures 1 and 2 show that all strains showed similar abilities to survive in the presence of 3 mM hydrogen peroxide and 1 mM t-butyl hydroperoxide tested.

Discussion

Based on our results it appears that the Mbp1 protein does not regulate a genetic response that induces resistance to oxidative stress. The Mbp1 protein does not appear to serve the same function in pathogenic Candida *albicans* as in non-pathogenic S. *cerevisiae*

Future Research

The lab is currently in the process of trying to create a *MBP1* and *SKN7* gene double mutant for characterization of morphogenesis under varying environmental conditions.

Acknowledgements

Funding was provided for by the Office of Research and Sponsored Programs and UWEC Differential Tuition. I would also like to thank Michael Davey for his assistance in the lab.