Biofilm Matrix Regulation by *Candida albicans* Zap1

Clarissa J. Nobile[1,2], Jeniel E. Nett[3], Aaron D. Hernday[2], Oliver R. Homann[2], Jean-Sebastien Deneault[4], Andre Nantel[4], David R. Andes[3], Alexander D. Johnson[2], and Aaron P. Mitchell[1,5 *]

[1] *Department of Microbiology, Columbia University, New York, NY, USA*
[2] *Department of Microbiology and Immunology, University of California-San Francisco, San Francisco, CA, USA*
[3] *Department of Medicine, University of Wisconsin, Madison, WI, USA*
[4] *Biotechnology Research Institute, National Research Council of Canada, Montreal, PQ, Canada*
[5] *Department of Biological Sciences, Carnegie Mellon University, Pittsburgh, PA, USA*

A biofilm is a surface-associated population of microbes that is embedded in an extracellular matrix. Known functions of matrix are to maintain the stability of the biofilm, acting as a glue to hold the cells together, and to protect cells from their surrounding environment, preventing drugs and other stresses from penetrating the biofilm. Thus matrix contributes to the high degree of antimicrobial resistance observed in biofilms. Because biofilms have a major impact on human health, it is important to understand how the production of matrix is regulated. We have begun to address this question in the major human fungal pathogen, *Candida albicans*. We found that the regulatory protein Zap1controls the expression of several genes important for matrix formation in *C. albicans*. These genes encode glucoamylases and alcohol dehydrogenases, enzymes that likely govern the synthesis of distinct matrix constituents. We postulate that the glucoamylases hydrolyze glucan chains, a major matrix component, and that the alcohol dehydrogenases generate signaling alcohols involved in cell-cell communication that indirectly regulate matrix production. Our findings provide a starting point to understand matrix production and function in this prevalent pathogen.