# New mechanism fundamental to the spread of invasive yeast infections identified

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A group of researchers led by Carnegie Mellon University Biological Sciences Professor Aaron Mitchell has identified a novel regulatory gene network that plays an important role in the spread of common, and sometimes deadly, fungal infections. The findings, which establish the role of Zap1 protein in the activation of genes that regulate the synthesis of biofilm matrix, will be published in the June issue of *PLoS Biology*.

Candida albicans is a fungus, more specifically a yeast, which approximately 80 percent of people have in their gastrointestinal and genitourinary tract with no ill effects. However, at elevated levels it can cause non-life threatening conditions like thrush and yeast infections. A C. albicans infection becomes much more serious, and can be lethal, in those with compromised immune systems who have an implantable medical device, such as a pacemaker or artificial joint, or who use broad-spectrum antibiotics.

Central to such infections is the biofilm - a population of microbes, in this case C. albicans cells, joined together to form a sheet of cells. The cells in the biofilm produce extracellular components such as proteins and sugars, which form a cement-like matrix. This matrix serves to protect the cells of the biofilm, preventing drugs and other stressors from attacking the cells while acting as a glue that holds the cells together. By doing this, the matrix provides an environment in which yeast cells in the biofilm can thrive, promoting infection and drug resistance.

"Biofilms have a major impact on human health and matrix is such a pivotal component of biofilms. It is important to understand how the production of matrix is regulated," Mitchell said.

In the study, Mitchell and colleagues found that the zinc-responsive regulatory protein Zap1 prevents the production of soluble b-1,3 glucan, a sugar that is a major component of matrix. They also identified other genes whose expression is controlled by Zap1, called Zap1 target genes. They found that these genes encode two types of enzymes, glucoamylases and alcohol dehydrogenases, which both govern the production and maturation of matrix components.

"Understanding this novel regulatory gene network gives us insight into the metabolic processes that contribute to biofilm formation, and the role the network plays in infection," Mitchell said. "By better understanding the mechanisms by which biofilms develop and grow, we can start to look at targets for combating infection."

Source: Public Library of Science (news : web)