



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) David K. Tang-Quan	Project Number S1799
Project Title Isolation of Kinase Mutant Genes Governing Stress Response of Candida albicans	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In immuno-compromised patients, the fungus <i>Candida albicans</i> can enter the bloodstream, infecting most organs of the body and resulting in disseminated candidiasis, which has a 50% mortality rate, even with treatment. In healthy individuals, white blood cells protect against candidiasis by secreting antimicrobial peptides. For <i>C. albicans</i> to colonize patients and cause disease, it must be able to withstand these antimicrobial peptides.</p> <p>Methods/Materials Approximately 100 strains were screened for hyper-susceptibility to antimicrobial peptides. Hyper-susceptible strains were retested alongside a second independent clone. Additionally, gene deletion mutants and complemented strains were acquired and tested. Finally, the kinase insertion mutants were transformed with the <i>HIS1</i> gene and retested in the absence of histadine.</p> <p>Results Hyper-susceptible strains such as <i>SSK2</i>, <i>PBS2</i>, and <i>HOG1</i> were discovered, proving their necessity for <i>C. albicans</i> stress response. Hypo-susceptible strains were also discovered, suggesting that <i>C. albicans</i> has an adaptive response when certain genes are removed.</p> <p>Conclusions/Discussion Kinases are indeed required for <i>C. albicans</i> to grow in the presence of antimicrobial peptides. Most significantly, three members of the <i>HOG1</i> kinase pathway, <i>Ssk2</i>, <i>Pbs2</i>, and <i>Hog1</i>, are required for antimicrobial peptide resistance in <i>C. albicans</i>. Pharmacologists can then develop medication that can inhibit the <i>HOG1</i> kinase pathway and thereby prevent <i>Candida</i> infections.</p>	
Summary Statement This study discovered that the <i>HOG1</i> kinase pathway controls the resistance of the fungus <i>Candida albicans</i> to antimicrobial peptides.	
Help Received Mentored by Dr. Scott Filler, overseen by Ms. Norma Solis, at Los Angeles Biomedical Research Institute	