CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
S1416

Project Title
Antimicrobial Peptide Susceptibility of Candida albicans Kinase Mutants

Abstract

Objectives/Goals
Disseminated candidiasis occurs in hospitalized patients when the fungus, Candida albicans, enters the bloodstream and infects almost all organs of the body. The mortality rate of this disease is close to 40%. Immunocompromised patients can also develop oropharyngeal candidiasis, or Candida overgrowth in the mouth. Although the mechanisms behind C. albicans defense against reactive oxygen intermediates have already been discovered, the mechanisms for resistance to antimicrobial peptides are still unknown.

Methods/Materials
Sixty-four kinase mutants were screened with protamine containing antimicrobial peptides to discover mutant strains that were hyper-susceptible. Serial dilutions of each strain were pipetted onto protamine and YPD plates, starting at 10^8 cells/ml and decreased by a factor of 10 until the final concentration of organisms was 10^3 cells/ml. Hyper-susceptible strains were retested and the validity of results was further confirmed in a trial using a second, independent clone.

Results
Results from the first 96-well microtiter plate of kinase mutants showed three genes that are responsible for hyper-susceptibility to antimicrobial peptides: PBS2, YCK2, and HST7. Findings from the second 96-well plate of kinase mutants were unconfirmed, but six possible hyper-susceptible strains and some likely hypo-susceptible strains were identified.

Conclusions/Discussion
It was concluded that the genes PBS2, YCK2, and HST7 play a significant role in C. albicans resistance to antimicrobial peptides. Further research to confirm the validity of these results includes gene complementation and a clean knock out of genes. Pharmacologists and other medical researchers can use these findings to determine which genes need to be inhibited when developing medications for Candida infections.

Summary Statement
This study focuses on identifying the genes responsible for Candida albicans resistance to antimicrobial peptides.

Help Received
Used lab equipment at Los Angeles Biomedical Research Institute; mentored by Dr. Scott Filler; supervised by Norma Solis.