CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
S1721

Project Title
The Effects of Monotherapy vs. Combination Therapy on Methicillin Resistant Staphylococcus aureus to Suppress Resistance

Abstract

Objectives/Goals
The objective is to study the optimum bactericidal effects of monotherapy versus combination therapy on MRSA by using the Kirby-Bauer method.

Methods/Materials
MRSA bacteria was inoculated to six agar plates. Positive battery test was used to dispense various antimicrobial discs: bactrim, cipro, clindamycin, erythromycin, gentamycin, nitrofuratoin, oxacillin as a control, vancomycin, synercid, and zyvox onto three plates. Three other nutrient agars were treated with the following combination antibiotics: vancomycin as a control, vancomycin plus bactrim, vancomycin plus cipro, vancomycin plus gentamycin, vancomycin plus synercid, and vancomycin plus zyvox. Note that the antibiotic combinations were placed side-by-side touching each other in the plates treated with combination therapy. After 18 hours of incubation, the zone of inhibitions were measured, tabulated, and graphed to elucidate the effects of different therapeutic regime with various antibiotics versus the radii of the zone of inhibition of MRSA growth.

Results
Combination antimicrobial therapy is superior to monotherapy in treating MRSA infection due to different mechanism of actions and synergistic effects.

Conclusions/Discussion
Combination therapy exhibits synergistic antimicrobial effects due to simultaneous assaults on the MRSA by deploying different mechanism of actions. Thus, combination antimicrobial therapy was proven to confer the optimum antimicrobial effects on Methicillin Resistant Staphylococcal aureus (MRSA) infection and thus prevail over resistance.

Summary Statement
My project is to compare the antimicrobial effects of monotherapy versus combination therapy on MRSA growth.

Help Received
I used the microbiology lab at Desert Medical Regional Center Hospital with the help of lab supervisor John Frazier and under the supervision of Dr. David Wong. In addition, great appreciation to Dr. Jolene Abraham and Dr. Bryan Hodgkin, director of Pharmacology Department for providing information.