CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

33734

Project Title

Solution Sensation: A Study of the Antimicrobial Effectiveness of Contact Lens Solutions against MRSA

Abstract

Objectives/Goals

The objective of this experiment was to find which out of five RGP contact lens solutions: Boston Advance Conditioning Solution; Lobob Soaking Solution; Boston Simplus Multi-Action Solution; Menicare Multipurpose Solution; and Opti-Free GP Multi-Purpose Solution, prohibited the growth of MRSA strain TCH 1516 the most effectively.

Methods/Materials

MRSA TCH 1516 was grown onto a Todd Hewitt Agar plate. A colony was put into 5 ml of Todd Hewitt Broth and was grown for 7 hours, was spun in a centrifuge for 6 minutes, then diluted to an optical density of 0.40 using a spectrophotometer. It was then diluted to 1:20 in phosphate buffered saline. 200 µl of each solution, 2 wells each, were pipetted into an assay plate, Row A. 100 µl of CA-MHB broth was added to all other wells. 100 µl from Row A was moved to Row B, then from B to C, etc until the last row. 90 µl of every well was moved to a new assay plate and a positive/negative control was added. 10 µl of the bacteria solution was added to every well except the negative control. The plates were parafilmed then placed in a shaker incubator for 15 hours. After incubation, 10 µl of rezasurin was added, and the plates were incubated for 24 hours.

Results

The saline averaged 45% in the percentage of solution in which bacteria began to grow, and the bacterial growth was extremely high. Advance averaged 1.58203125%, placing 2nd in terms of effectiveness after Simplus' 0.52734375%. There was a defined "dot" in the bottom center of the well, with a cloud of growth around it smaller than in saline. Lobob averaged 5.625%, Menicare averaged 2.8125%, and lastly, Opti-Free performed the "worst", averaging 14.0625%.

Conclusions/Discussion

Boston Simplus, was most effective in discouraging growth of MRSA, and average of the percentage in which bacteria began to grow was 1.58203125%, rather than the hypothesized 2.8125%. Solution 2, Boston Advance, was second most effective and was most effective out of the two-step solutions, averaging 1.58203125%, rather than the hypothesized 2.8125%. The three other solutions did not perform as well (due to less thorough preservative combinations?). The sterile saline control averaged 45%, which proved that the preservatives did make a difference in antimicrobial strength. The two preservatives that seemed to be most effective in combination were Chlorhexidine Gluconate and Polyaminopropyl Biguanide, both contained in the top two solutions.

Summary Statement

This project tested the antimicrobial effectiveness of 5 RGP lens solutions and a saline control against MRSA TCH1516.

Help Received

Used lab equipment at UCSD under supervision of Dr. Victor Nizet, Mr. Leo Lin and Wdee Thienphrapa. Mother and father drove me and bought lens solutions.

Preliminary