



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Erika R. Witt</b>	<b>Project Number</b> <b>S1526</b>
<b>Project Title</b> <b>Determining Which Antibiotic Is Most Likely to Prevent Resistance by Effectively Killing Bacteria</b>	
<b>Abstract</b> <b>Objectives/Goals</b> In the past, bacterial infections were deadly, but today they can be treated with antibiotics. Bacteria can mutate and become resistant to the antibiotics used to treat them, and these strains can be lethal. The purpose of my experiment was to find the antibiotic most likely to kill and least likely to leave inhibited bacteria, reducing the chance of mutation and resistance. <b>Methods/Materials</b> Three antibiotics were tested against Escherichia coli bacteria; Cefazolin, Ofloxacin and Gentamicin. Test tubes containing bacteria and media with seven different concentrations of each antibiotic were incubated and monitored for growth. The concentrations without visible growth were then sub-cultured to determine which concentrations only inhibited the bacteria (Mean Inhibitory Concentration, [MIC]), and which concentrations killed them (Mean Bactericidal Concentration [MBC]). I monitored the growth of the bacteria to see if there was a difference between the MIC and the MBC of each antibiotic. The fewest dilutions between the two concentrations showed which antibiotic killed most effectively, without permitting time for bacteria to mutate. <b>Results</b> The antibiotic Cefazolin had no identifiable MBC. Ofloxacin had three dilutions between the MIC and the MIC, and Gentamicin's MIC was the same as its MBC <b>Conclusions/Discussion</b> In conclusion, Gentamicin was the best antibiotic for treating E. coli because the MIC was the same as its MBC, and therefore left no chance for inhibited bacteria to become resistant. In contrast Ofloxacin had a range of dilutions between the MIC and MBC, potentially enabling it to continue growing and select for resistance. Cefazolin never reached an MBC, meaning it cannot kill bacteria at a concentration tested, and therefore leaves a greater chance for bacteria to continue growing and develop resistance.	
<b>Summary Statement</b> My project focused on determining which antibiotic was most effective and most likely to prevent the development of resistant bacteria.	
<b>Help Received</b> My father, an infectious disease doctor, helped me obtain materials and supervised my techniques and the safety of the project.	