



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Arsen Beremesh	Project Number S1403
Project Title Reproductive Inhibition Potencies of Naturally Derived vs. Synthetically Manufactured Antibiotics: A Study of E. coli	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine the potencies of natural antibiotics in relation to one another as well as to their synthetically manufactured counterpart. My ultimate goal is to demonstrate substantial data that will contribute to the increase of naturally derived commercial pharmaceuticals such as antibiotics.</p> <p>Methods/Materials The naturally derived antibiotics were melaleuca oil, linden tree honey, olive leaf extract and grapefruit seed extract, while the synthetically manufactured antibiotic was ampicillin. The E.coli was obtained from Ward#s catalog and cultured on agar medium. Potency of each antibiotic was determined by the area of inhibition. Trials were conducted at different concentrations and masses of antibiotics. Water-soluble antibiotics ranged from concentrations of 100-500 mg/5mL of distilled water and the water-insoluble antibiotics ranged from masses of 100-500 mg.</p> <p>Results Ampicillin had the greatest area of inhibition at a concentration of 100mg/5mL distilled water. Grapefruit seed extract had the greatest area of inhibition at 300mg/5mL distilled water. Olive leaf extract had the greatest area of inhibition at 200mg/5mL. Linden tree honey had the greatest area of inhibition at 100 mg. Melaleuca oil had the greatest area of inhibition at 500 mg. Amongst all of the antibiotics, natural and synthetic, grapefruit seed extract was overall the most potent antibiotic agent.</p> <p>Conclusions/Discussion E.coli possesses receptor protein EnvZ, which becomes activated once the extracellular environment becomes greatly hypertonic in relation to the cytoplasm. In turn, the activation transduces the signal for the synthesis of OmpF, a protein that prevents the solutes from traversing the cellular membrane through the specialized pores. This mechanism accounts for the low average potency of linden tree honey that functions antibiologically by means of plasmolysis. Grapefruit seed extract possesses phenols which cause disorganization of cytoplasm and leakage of cellular particles of low molecular weight. Olive leaf extract contains oleuropein, which disrupts production of essential amino acids. Melaleuca oil contains terpene, which targets bacterial species of specific electrical charges. Ampicillin functions by disrupting the synthesis of cell walls.</p>	
Summary Statement My project is about establishing the relative potencies of naturally derived antibiotics and their potential in the pharmaceutical industry.	
Help Received The completion of this study was facilitated by the efforts of fellow classmates, teachers, and friends. Those who have aided me in this study have done so by guiding me through the process of purchasing materials and allowing the use of materials.	