



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

<b>Name(s)</b> <b>Ahmad Ismail</b>	<b>Project Number</b>  38408
<b>Project Title</b> <b>Effect of Combination Antifungal Therapy on the Treatment of Candidiasis</b>	
<b>Objectives/Goals</b> The objective is to study the effect of combination antifungal agents on the treatment of candidiasis and the yeast cellular structure to develop a treatment. <b>Abstract</b> <b>Methods/Materials</b> Water Volume Displacement: A gas collection apparatus was set up which comprised of an inverted graduated cylinder and a tub filled with water. The cylinder and a plastic bottle were connected to tubing. Agents were tested by being applied to the yeast solution in the bottle. CO <sub>2</sub> produced by the yeast travelled through the tubing, displacing water in the cylinder. Broth Cultures: Test tubes were prepared with liquid broth. Yeast solution was pipetted into the tubes, and were incubated for 3 days on an Orbital Shaker. Weight of the colonies measured the yeast growth. Agar Cultures: Petri dishes were prepared with agar. Yeast solution was spread onto the plates, and then incubated for 6 days. Area of the colonies were measured. <b>Results</b> The effectiveness of treatments were compared after conducting multiple trials in the above-mentioned experiments. From all three methods, the synthetic azoles and allylamines combination was most effective in treating yeast, and the natural allylamines and cell wall inhibitors combination was the least effective. Low data values indicate high effectiveness, as there is less amount of yeast cells. For the agar cultures, lines of best fit (derived using exponential regression) were drawn to model the growth. Standard deviation was calculated. <b>Conclusions/Discussion</b> The synthetic azoles and allylamines combination was the most effective therapy to treat candidiasis. Whenever both azoles and allylamines are present, the combination is effective; the yeast cells cannot become resistant to the treatment, though it would become resistant to allylamines in monotherapy. Comparing combination to monotherapy shows that their effectiveness is between that of synthetic monotherapy and natural monotherapy. More tests are needed to identify the secondary positive benefits of natural agents and the negative effects of synthetic agents. If there are any, then combination therapy will be the most effective, taking into account all factors. We can notice that certain target organelles in the yeast cell increase the effectiveness of the therapy. The cell membrane is most effective, as clogging and making it dysfunctional prevents the cell from excreting wastes and getting the nutrients for necessary cellular processes.	
<b>Summary Statement</b> I tested combination antifungal agents to study the yeast cell's effect in the treatment of candidiasis; I found that the synthetic azoles and allylamines combination is most effective as it makes the membrane enzymes/proteins dysfunctional	
<b>Help Received</b> I designed the project and conducted the experiment independently. My Science teacher guided me through this project and reviewed my results.	