



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Eric T. Yu	Project Number J2135
Project Title The Effectiveness of a Household UVC Wand in Reducing Bacterial Contamination	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I had heard UVC light could be used to kill bacteria. I also found there were UVC wands commercially available for household use. I designed an experiment to test a UVC wand product. I focused on the time it took the wand to kill bacteria, and the distances above the bacteria at which the wand would be effective. The wand's specifications stated that general cleaning could be achieved if the wand was waved over the targeted area for 20 seconds at a distance of 2.5 cm. I predicted the UVC wand would meet its specification of 20 seconds of treatment at a distance of 2.5 cm. I believed UVC light was an effective method of killing bacteria, and this would be reflected in my results.</p> <p>Methods/Materials I obtained a Germ Guardian UVC Sanitizing Wand. I built three wooden holders that held the UVC wand consistently 2.5 cm, 5.0 cm, or 10.0 cm from the testing sample. I tested for 20, 40, and 60 seconds. An adult helper activated the UVC wand and performed the UVC treatments as I timed the process in an adjacent room. I used Coliscan Easygel and nutrient agar to help identify and culture the results. I inoculated the media directly as a liquid or in a gel state. To obtain bacteria samples from surfaces, I used cotton swabs and inoculated either the Coliscan media or the nutrient agar.</p> <p>Results A total of 63 plates were inoculated with swabs from carpet, shoe, cutting board, pillow, and washcloth surfaces. I also tested creek and aquarium water samples. For all of the test treatments, the UVC wand showed no reliable ability to destroy bacteria. Even at 40 and 60 seconds there were often numerous bacteria after the UVC treatment. No particular distance or time appeared to be consistently effective in reducing the quantity of bacteria.</p> <p>Conclusions/Discussion According to my results, the household UVC wand isn't a reliable or dependable product. The UVC wand couldn't kill 99% of all bacteria on a consistent basis at distances of 2.5, 5.0, or 10.0 cm and at times of 20, 40, and 60 seconds. I do believe using UVC light is an effective way of killing bacteria. The manufacturer's directions were to wave the UVC light wand over the intended target, but with the wand's low intensity, it would perhaps be better to concentrate the light in a stationary position for a set length of time. This would be a very painstaking and tedious way to disinfect any surface and would require an inordinate amount of time and precision.</p>	
Summary Statement I tested a household UVC wand's effectiveness in sanitizing a surface from three different distances (2.5, 5.0, and 10.0 cm) at time intervals of 20, 40, and 60 seconds.	
Help Received Thanks to my science teacher who taught me sterile procedures. Thanks to my mother who used the UVC wand while I timed in an adjacent room. Thanks to my father who purchased wood for the holders i built.	