



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

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<b>Project Title</b> <b>Effect of Third Hand Nicotine on Daphnia magna</b>	
<b>Objectives/Goals</b> Objective: What is the effect of third hand nicotine on daphnia magna? Purpose: Third hand nicotine is the residual nicotine left by smokers on many surfaces like clothes, carpets, etc. We know first, second and third hand tobacco smoke can harm you. But, can the nicotine harm people who are exposed to it? This experiment will test the effect of third hand nicotine on daphnia magna, to understand the effect on humans. <b>Abstract</b> <b>Methods/Materials</b> Materials: Live daphnia magna, E-cigarettes with nicotine solution (18mg/ml), microscope, and cotton cloth. Method: For this experiment, the daphnia magna will then be divided into 3 test groups and 1 control group. Each group will have 3 or 5 daphnia magna, depending on the trial. 3 cloths with different nicotine concentrations will be placed into each of the test groups. I will measure the longevity and heart rates of the specimens in each group. I will complete 4 trials. <b>Results</b> After the experiment, I found that third hand nicotine actually harms living beings. The mortality rate of the daphnia magna was directly proportional to the nicotine concentration. In test groups 2 and 3, 100% of the specimens died within 7 days. In test group 3, 100% specimens died within 24 hours in three of four trials. In the control group, all specimens survived until the end in trials 1 and 2, and 40% survived in trials 3 and 4. Test groups 1 and 2 showed significant increase in heart rates over the period of 8 days. In test group 3, in trial 1, the daphnia magna had an increase of over 100 BPM in the heart rate. The heart rates of the control groups had varied results each day, probably because of factors like size, age, and reproduction in females. I also observed significant reproduction in the control group, very low reproduction in test groups 1 and 2, and no reproduction in test group 3. <b>Conclusions/Discussion</b> My experiment shows that third hand nicotine increases the heart rate and lowers the life span of living things. This experiment showed that nicotine causes a much higher chance of tachycardia, which is a disorder causing abnormally high heart rate. If I do this experiment again, I would like to use more daphnia magna and use a more accurate way of measuring heart beats rather than my eyes. All cigarette and e-cigarette users should try their best to stop smoking, not just for their health but for the health of the people around them.	
<b>Summary Statement</b> This experiment tests the effect of third hand nicotine on daphnia magna, to understand the effect on humans.	
<b>Help Received</b> My teacher, Mr. Lampard, helped me with statistical outputs. My father helped me order the materials and design the board.	