



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Caroline S. Choi</b>	<b>Project Number</b> <b>J2101</b>
<b>Project Title</b> <b>Drugs in Our Waters Make Daphnia's Hearts Flutter: The Effect of OTC Medications on Aquatic Life</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment was to determine whether exposure to over-the-counter medications (aspirin, acetaminophen, diphenhydramine, pseudoephedrine) adversely affects the health of aquatic life.</p> <p><b>Methods/Materials</b> Four groups of five daphnia magna were exposed to the different medication solutions, with the concentration being the common dosage of each medication in 500 mL of water. The daphnia's heart beats were counted under the view of a microscope. The heart rate of each daphnia was measured in beats per minute after 10, 20, 30, 45, and 60 minutes of exposure to the medication. These heart rates were then compared to the daphnia's heart rate without exposure to medications.</p> <p><b>Results</b> Pseudoephedrine elevated the heart rate of the daphnia by 12%. Aspirin, acetaminophen, and diphenhydramine slowed the heart rate of the daphnia by 29%, 12%, and 6% respectively. Furthermore, daphnia exposed to aspirin and acetaminophen were associated with arrhythmias, or irregular heart rhythms.</p> <p><b>Conclusions/Discussion</b> All over-the-counter medications tested affected the daphnia's heart rate. However, the group of daphnia exposed to aspirin had the most decreased heart rate, while the group of daphnia exposed to pseudoephedrine had the most elevated heart rate. Because medications affect the health of daphnia - microorganisms at the bottom of the aquatic food chain - they will affect the health of all aquatic life. Medications that get into the aquatic system due to improper disposal and excretion in waste negatively affect the health of daphnia. Studies have shown that medications escape through waste-water treatment facilities and end up in rivers and oceans. This data suggests there needs to be increased public education on proper disposal of medications and methods to remove medications from waste-water need to be found.</p>	
<b>Summary Statement</b> This project demonstrates that medications that enter waterways through waste-water and improper disposal harm the health of aquatic life, and measures must be taken to treat this source of environmental pollution.	
<b>Help Received</b> Mother timed heart-beat counts and helped crush medication tablets for dissolution.	