



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Jessica L. Cao	Project Number S1703
Project Title Household Cleaning Hazards: Investigating Effects of Chemicals in Windex and Formula 409 on A549 Lung Epithelium	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to test (a) how household cleaning products, such as Windex, and Formula 409, and the carcinogenic chemicals that the aforementioned cleaners consist of, such as perchloroethylene, sodium hydroxide, and 2-butoxyethanol, affect the proliferation of A549 lung epithelium subsequent to in vitro exposure, as well as (b) which chemical can be identified as the #culprit# for such effects. The goal is to test the hypothesis sodium hydroxide will warrant cell death while the rest will instigate proliferation.</p> <p>Methods/Materials Each of the five agents, and a Phosphate Buffered Saline control were applied to the cell media at a serial dilution going from the concentration in misted Windex/Formula409, to a 1:10 and 1:100 dilution. The well plates were then incubated over night in a water-jacketed incubator at 37 C 5% CO2. Subsequently, the data was collected in terms of cells/mL (using a hemocytometer), and in terms of ATP Levels (using an ATP Assay in which luciferase induced production of ATP and photons measured by a luminometer).</p> <p>Results Sodium hydroxide treated media caused the most cell death, followed by media treated with Formula 409, Windex, perchloroethylene, and finally 2-butoxyethanol which yielded the highest number of cells next to the PBS control media. Generally, cells/mL decreased linearly with an increase in dosage of the agent, thus indicating that each agent caused some form of cell death.</p> <p>Conclusions/Discussion When based solely on results collected in this time frame, the hypothesis was refuted in that all of the agents engendered cell death in lieu of proliferation. However, cells exposed to Windex and carcinogenic chemicals listed by the EPA and OSHA were damaged but exhibited high ATP levels and quick repair, which eludes to potential effects of long term exposure based on the initial observations. The experiment can be extended through a prolonged study at a molecular level, observing mutagenic effects of such chemicals on DNA of adenocarcinoma lung cancer cells.</p>	
Summary Statement This project investigates the effects of insidious chemicals found in seemingly innocuous household products on A549 lung epithelium, and in doing so, one can develop increased cognizance of harmful chemicals in today's innovative society.	
Help Received Used lab equipment at University of California, Riverside, under the superivion of Dr. Kathryn DeFea, PhD; Parents helped assemble wooden board and drill in hinges.	