



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)

Eduardo H. Duque II

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)

Cytotoxicity: Cytotoxic effects of 2,4-DNT, 2,6-DNT, and 2,4,6-TNT on human liver carcinoma cells through an LDH assay

Science Fair Use Only

S1310

Division

Junior (6-8) Senior (9-12)

Preferred Category (See page 5 for descriptions.)

13 - Pharmacology / Toxicology

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)

Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

As we live in a world full of various chemicals, we have now begun to see that sometimes our exposure to these substances can put everyday ordinary people at risk for disease, injury, or even death. Thus, the main objective and significance of this project is to examine the cytotoxic effects of the chemicals 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene and 2,6-Dinitrotoluene on human liver carcinoma cells (HepG2 cells). Previous experiments have shown that the TNT and DNT compounds are toxic to the liver and the blood. Also, these compounds have been implicated as potential carcinogens. These chemicals are found in the wastewaters of Army Ammunition Plants and have thus contaminated the local soil, surface water, and ground water. To approach the problem, several scientific methods and techniques are used. Cells are first seeded in 6-well tissue culture plates. Then the cells are exposed to the various concentrations of the certain chemicals and incubated in a CO₂ incubator. Afterwards, an LDH Assay is performed using a spectrophotometer. By using the OD readings from the spectrophotometer, a Dose Response Curve is then plotted. Also, by using the optical density readings of the LDH release Assay, the LC₅₀ values of each chemical concentration was determined. Each experiment was done in duplicates.

After the experiment was done, it was shown that the LC₅₀ value for 2,4-Dinitrotoluene is between 200 ppm (which yielded a percent cell death of 41.24%) and 300 ppm (which yielded an LC₅₀ value of 57.37%). For the cells treated with 2,6-Dinitrotoluene, it was found that the LC₅₀ value was found in a concentration that is well above 500 ppm (which yielded a percent cell death of 32.27%). And finally, it was discovered that the LC₅₀ value of the cells that were treated with 2,4,6-Trinitrotoluene can be found in a concentrations around 8 PPM (which yielded a percent cell death of 46.62%). In conclusion, it was found that the order of decreasing toxicity was 2,4,6-TNT, 2,4-DNT, and 2,6-DNT. But on the other hand, there were also some unexpected findings. It was noted that in 2,4,6-TNT and the 2,4-DNT samples there was a drop in percent cell death in the samples that were dosed with the higher concentrations as analyzed in this experiment.

Summary Statement (In one sentence, state what your project is about.)

My project is about examining the cytotoxic effects of 2,4-DNT, 2,6-DNT, and 2,4,6-TNT on human liver carcinoma cells through an LDH release assay.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.

Used lab equipment at Jackson State University under the supervision of Dr. Wilson; participant in NASA SHARP Plus Program, mentor in the program provided guidance and help throughout the experiment.