CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Samantha Tovar

Project Number
J2118

Project Title
Arresting Mitotic Division in Allium cepa Cells: A Phase I Cancer Study

Abstract

Objectives/Goals
My project is an introduction for me into cancer therapies. Many cancer therapies basically target tumors and stop mitotic division by interfering with spindle fiber formation in metaphase. Since I was not allowed to use animal tissues for this project, I chose Allium cepa roots to examine this process. I read about an ancient substance used by the Greeks and Egyptians written about in 1500 B.C. for the treatment of gout. Colchicine, a natural product originally extracted from the plant autumn crocus, Colchicum autumnale, was looked at in the 1920#s as a cancer therapy. More recently, efforts are being made to determine how to apply its properties of stopping spindle fiber formation in metaphase in animal tumors by engineering specific substances that target only tumor cells.

Methods/Materials
Basically I followed old homeopathic protocols and boiled the bulb, petals, and seeds of crocus plants. I created 4 different concentrations of 1 ml, 2 ml, 3 ml, and 4 ml of emulsion per 10 ml distilled water, and placed these directly into test tubes were I hydroponically grew green onions. I had no way available to me to exactly quantify any colchicine available. After one week, I prepared 28 specimen slides of the root tips and examined them for mitotic division in any stage.

Results
I found that concentrations of my distillate at 1 ml per 10 ml water, 2 ml/10 ml, and 3 ml/10 ml had no effect on mitotic division. There was no visible difference between any of these and my controls. All stages of mitosis were visible. When I applied 4 ml /10 ml, mitotic division appeared arrested in all slides I examined. I noted some prophase division, but nothing beyond that.

Conclusions/Discussion
My conclusion is that the colchicine derived from the bulb, seeds, and petals of the autumn crocus plant appears to successfully arrest mitotic division in plant cells at the metaphase stage.

Summary Statement
This project examines if colchicine from the autumn crocus plant will arrest mitotic division in Allium cepa root cells.

Help Received
My teacher provided my lab supplies and lab room. All work was mine.