CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
S1418

Project Title
The Effect of Antioxidants on the Treatment of Breast Cancer with Tamoxifen

Abstract

Objectives/Goals
The objective is to examine the role of antioxidants in the development of resistance to Tam in breast cancer. Since antioxidants reduce oxdiative stress, they should help the cancerous cells survive.

Methods/Materials
First, I treated the moderately sensitive MDA-MB-231 breast carcinoma cells with Tam at 20 ìM for two hours, either alone or with one other antioxidant. The seven antioxidants were: NAC, N-acetylsysteine at 1 mM; vit. C, vitamin C at 1 mM; vit. E, vitamin E at 100 ìM; â-carotene at 100 ìM; SOD (40 unites/ml); catalase (1000 units/ml).
In the second experiment, the cells were seeded in 35-mm Petri dishes. I treated them with Tam at 5 or 10 ìM, either in the presence or absence of vitamin E at 100 ìM. Cells were trysinized and then counted on the Coulter cell counter. The values represent the mean of three dishes.

Results
In the first experiment, without any added compounds, the breast cancer cells had the highest PKC activity in the control compared to the others. The PKC activity dropped drastically when the cells were treated with only Tam.
Vitamin E had the higest PKC activity. NAC, N-acetylcysteine, was the least effective in blocking the oxidative stress.
In the other experiment, I used the same cell line and tested the extent of the interaction between Tam levels vitamin E. The cells with only vitamin E grew the fastest. The control was right behind it. On the other hand, the ones treated with 10ìM of Tam showed the lowest reading, meaning that the cells were killed by the drug. When vitamin E was applied with Tam, the cell still grew relatively fast.

Conclusions/Discussion
In the first experiment, the results show that most antioxidants do counter the effectiveness of Tam, which was my hypothesis. Because antioxidants reduce oxidative stress, cells had a higher rate of PKC activity when compared to the only Tam Petri dish. Vitamin E had the most adverse effect against Tam because the cells had a more rapid PKC activity rate. NAC had the lowest PKC activity.
The second experiment was conducted to further support first experiment.The focus of the data is how vitamin E and Tam would react when present together in a cell. Vitamin E successfully blocked most of the oxidative stress, since the readings were high. At a higher dose, 10ìM, Tam lowered the rate a little. Overall, when vitamin E was present in addition to Tam, the drug proved to be less effective than if used alone.

Summary Statement
Vitamin E had significant adverse effects on the treatment of breast cancer cells with Tamoxifen.

Help Received
Professor Rayudu Goplakrisna at the University of Southern California, School of Medicine helped handle radioactive substances in the experiments and also provided lab equipments as well as insightful advice to my experiments.