CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
S1419

Project Title
The Effect of Curcumin on B-Cell Leukemia

Abstract

Objectives/Goals
Turmeric is a bitter and pungent herb found primarily in Southeast Asia. Curcumin, turmeric extract, is known for its anti-cancer, anti-oxidative, anti-viral, anti-arthritic, anti-bacterial, and other effects. B-Cell Leukemia, a form of leukemia under the sub-categories of acute lymphocytic and chronic lymphocytic leukemia, can be detected through a test which looks for marker proteins on B-lymphocytes. The objective of this study was to determine if curcumin has the ability to induce apoptopis in B-Cell Leukemia cancer cells.

Methods/Materials
This study consisted of 4 separate procedures. The first procedure involved creating the cancer cell medium by using amino acids, vitamins, penicillin streptomycin glutamine, and fetal calf serum to create an environment for the cancer cells to proliferate in. The second procedure was the creation of the curcumin. Curcumin was mixed with Dimethyl Sulfoxide to create a liquid solution. The third procedure involved the lab setup. 6 test tubes were obtained and each was used for a different concentration (in micromolar) of curcumin.The concentrations used were 0, .625, 1.25, 2.5, 5, 10. The cell solution and cancer cell medium were also added to these test tubes proportionately. The last procedure involved obtaining results using a Becton-Dickson FACscan Flow Cytometer.

Results
The results proved that curcumin is effective in preventing the proliferation of B-Cell Leukemia cancer cells. The lower concentrations of curcumin were less effective in preventing the proliferation of the cancer cells than the higher concentrations.

Conclusions/Discussion
In this study, the apoptopic death was indicated by the flipped phospholipid phophatidylserine. Propidium iodide was unsuccessful in determining apoptopic death in some trials because the phagocytic cells hadn't broken the cancerous cells into fragments. Annexin V was used to stain the cancerous cells that were in an early form of apoptosis. Researchers indicate that this is the first time the effect of curcumin has been tested on B-Cell Leukemia. This study proved that curcumin has an ability to induce apoptosis in the B-Cell Leukemia cancer cells. A recent article in the Science magazine discusses curcumin's ability to suppress cystic fibrosis and lung disease. Clearly, curcumin can be used in the future for medical-related research and possible prevention of diseases.

Summary Statement
This project explored the apoptopic death induced by curcumin on B-Cell Leukemia by using Propidium Iodide and Annexin V to examine the death of the cancer cells.

Help Received
Used lab equipment at University of California, Irvine, under the supervision of Dr. Sastry Gollapudi.