CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Theresa T. Tran

Project Number
S0420

Project Title
Living with Cancer: Detection of Circulating Tumor Cells with Cytokeratin and EpCAM Antibodies

Abstract

Objectives/Goals

Almost all cancer related deaths are caused by metastases, when tumor cells from the primary tumor invade the blood stream. These circulating tumor cells, or CTCs, travel to distant sites in the body, causing lethal disease. The presence of CTCs has been correlated to poor prognosis of cancer patients and is important in the study of this incurable disease.

Because certain cancer cells are of epithelial origin, CTCs can be identified by using fluorescent antibodies that are specific for epithelial cell proteins. Two common epithelial proteins are cytokeratin and epithelial cell adhesion molecule (EpCAM) . Research has shown that the expression level of proteins found on cancer cells in primary tumors vary from cell to cell, which suggests the idea that CTCs also could have variable protein expression. In this study, EpCAM and cytokeratin antibodies were used to investigate whether the combination of both would help enhance the detection of CTCs in the blood of cancer patients as compared to using cytokeratin antibody alone.

Results

The average number of CTCs found in cancer patients using just cytokeratin antibody was 27, and the average number of CTCs found using both cytokeratin and EpCAM was 33.

Conclusions/Discussion

There was no significant difference detecting CTCs using these two conditions, the research hypothesis was rejected, and the null hypothesis was accepted that there is no significant difference between using cytokeratin antibody and a mixture of both cytokeratin and EpCAM antibodies. A significant difference only existed in one cancer patient suggesting that adding EpCAM can enhance detection of CTCs found in certain patients. The brightness and intensity of the CTCs when using cytokeratin as compared to both cytokeratin and EpCAM followed no pattern, resulting in no significant difference between the two conditions as well. However, the possibility of benefiting even a few patients makes EpCAM worth being further investigated.

Summary Statement

The project is a comparison between using cytokeratin antibodies and both cytokeratin and EpCAM antibodies in the detection of circulating tumor cells in the blood of cancer patients in order to find the most effective method.

Help Received

Used lab equipment at the Kuhn Lab at The Scripps Research Insitute under the supervision of Dena Marrinnucci and Daniel Lazar