



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) Hari Garg	Project Number J0509
Project Title Can Fibronectin Affect Cell Spread and Inhibit the Spread of Cancer? A Confocal Image Analysis	
Abstract Objectives/Goals The objective of this project is to determine the effect of concentration of fibronectin substrate on the amount of focal adhesions expressed by the cell and on the cell spread. Methods/Materials Fibronectin concentration (0,1,2,3,4, 8 µg/ml) were prepared. A stable lines of CHO cells with green fluorescent protein were placed in these microwells. 6 independent trials were conducted using 6 different concentrations of fibronectin. Olympus Fluoview Confocal Microscope was used to capture images. The cell spread data was analyzed with the Olympus Fluoview viewer software. Image J was used to analyze the number and area of focal adhesions. Results Cell Spread: CHO cells placed in microwell with no Fibronectin, showed no spread and remained the size of 10 µm each. Cells placed in 1 µg/ml showed an average spread of 41.43 µm with a 2 standard error of 17.99µm. Cells placed in higher concentrations showed increasing spread. Focal Adhesions: With no fibronectin, only 3 focal adhesions existed with total focal adhesion area of 10 square µm. Increasing the concentration of fibronectin, the number of focal adhesions increased to 199 and their total area grew to 625.28 square µm. Conclusions/Discussion The amount of focal adhesions and cell spread increased with the increase in concentration of fibronectin. One of the unique finding reported through my analysis, that has never been reported before, was that the increase in focal adhesion area was not proportional and was much larger than the increase in concentration of substrate material. For example, 4 times increased concentration of fibronectin resulted in an 8 times increased area of focal adhesions. This is an important finding because drug designers may create compounds to reduce fibronectin concentration in the vicinity of tumor and therefore inhibit metastasis (spread of cancer).	
Summary Statement This project determined the effect of changing the concentration of fibronectin on the amount of cell spread thereby identifying a factor that can inhibit spread of cancer.	
Help Received Mrs. Driscoll, my science teacher was my advisor. She reviewed and edited my project report. Confocal images were captured at UCI lab. Olympus Fluoview provided free licence to use software.	