



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Sailee Yadav	Project Number S0534
Project Title Targeting ER Stress in Type 2 Diabetes: A Bittersweet Battle	
Abstract Objectives/Goals Type 2 diabetes and obesity are major public health priorities because of their high prevalence and incidence in the U.S. population. Although the mechanisms underlying type 2 diabetes are incompletely understood, research has shown that exposure of pancreatic beta-cells to the environment and dietary stress induces endoplasmic reticulum (ER) stress that can ultimately lead to cell death and cause diabetes. In this project, we tested our hypothesis that bitter melon protects the cells from free fatty acid induced ER stress and hence is a potential anti-diabetic drug for the prevention and cure of type 2 diabetes. Methods/Materials We profiled how bioactives from bitter melon counter ER stress by analyzing the signaling involved in ER stress (HAC1 splicing) and exploring its downstream apoptotic pathways using baker's yeast (<i>Saccharomyces cerevisiae</i>) as a model. The dietary effects of omega-6 (gamma-linoleic acid) and omega-3 (alpha-linolenic acid) free fatty acids and 4-hydroxynonenal (4HNE), one of the stable byproducts of omega-6 fatty acid metabolism, were checked upon the induction of ER stress. We also tested whether bitter melon counteracted the ER stress caused by these dietary factors. The mean and standard deviation of three independent experiments was calculated. Results Our results show that bitter melon protects yeast cells from fatty acid induced ER stress and hence has the potential to be anti-diabetic therapy. Conclusions/Discussion These studies show that bitter melon target the endoplasmic reticulum and may help the cells to overcome ER stress. It can be a potential drug for cure and prevention of type 2 diabetes. Our ultimate goal is to develop a drug incorporating the "superfood" properties of bitter melon that will win the bittersweet battle against type 2 diabetes and other metabolic diseases.	
Summary Statement In this project, we explored the effects of bitter melon on fatty-acid induced endoplasmic reticulum stress as a mechanism for preventative drug therapy for type 2 diabetics.	
Help Received AP Biology teacher, Mr. Craig Monden, helped brainstorm techniques and ideas; Trained with lab procedures and equipment at City of Hope National Medical Center under the supervision of Dr. Sushma Yadav	