



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Mythri Ambatipudi	Project Number 33540
Project Title Diet Induced Thermogenesis! Combating Obesity, Diabetes & Heart Diseases Using Anthocyanins, Catechins & Capsaicins	
Abstract Objectives/Goals Obesity and related diseases such as Diabetes Mellitus (DM) and cardiovascular diseases (CVD) are caused by chronic imbalance between energy intake and expenditure. A novel strategy for combating this imbalance is through Diet Induced Thermogenesis (DIT). DIT, caused by enzyme inhibition or heat generation in brown adipose tissue, is the additional calories the body burns from its internal reserves due to special diet intake. DIT leads to reduced obesity and lower blood glucose, triglyceride & fatty acid levels. The objective of this project is to find a potential natural treatment for obesity, DM and CVD by testing if berries, teas, herbs & spices (BTHS) containing anthocyanins, catechins and capsaicins increase the DIT values of the carbohydrate, lipid & protein (CLP) macronutrients. Methods/Materials The in vivo processing of the CLP macronutrients was simulated in three in vitro experiments conducted on CLP solutions at 98 deg.F. CLP reactions were catalyzed with alpha-amylase, lipase and pepsin enzymes respectively. Equal concentrations of 14 types of BTHS extracts containing anthocyanins, catechins, capsaicins, proanthocyanadins and isothiocyanates were selected. The increase in the in vitro reaction times with the extracts (versus the control set up) was used to calculate their inhibitory effects on the enzymes and their DIT effects on the CLP macronutrients. Reaction rates were accurately measured with the innovative use of Benedict's, Biuret's and phenolphthalein indicators, bile salts, high accuracy pH & glucose strips, etc. Results Berry & tea extracts inhibited the hydrolysis of all three macronutrients. Raspberry increased the DIT values of carbohydrates (42.7%) and lipids (19.8%) the most while green tea increased the DIT value of proteins (9.9%) the most. IC(50) values (amount required for 50% inhibition) of raspberry, strawberry and green tea were among the lowest. DIT values of carbohydrates were improved the most followed by lipids. Contrary to the expectations, red chili capsaicin & ginger increased the reaction rates of the CLP. Conclusions/Discussion This project clearly demonstrates that adding BTHS rich in anthocyanins, catechins, proanthocyanadins & isothiocyanates to CLP macronutrients can increase their DIT effects. This can lead to reduced obesity, postprandial hyperglycemia & triglyceride levels. DIT effects of capsaicins need further research.	
Summary Statement My project aims to identify potential natural treatment for obesity, diabetes and heart diseases by increasing the DIT values of the macronutrients using foods rich in anthocyanins, catechins and capsaicins.	
Help Received My science teacher, Mrs. Makhijani provided valuable guidance. My parents purchased all the materials and provided encouragement.	