



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Alexa J. Aranja	Project Number S0402
Project Title The Effect of Licorice on the Mouse Hippocampus	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Parkinson's disease is a neurological disorder that affects about six million people worldwide and is characterized by resting tremors, bradykinesia, rigidity, akinesia, postural instability, and cognitive degeneration. Currently, treatments for Parkinson's disease have negative long-term effects, so a homeopathic approach may be more beneficial to treat Parkinson's disease. Throughout the world, licorice (<i>Glycyrrhiza glabra</i>) is used as a potent antiviral and a strong anti-inflammatory agent.</p> <p>Last year, my research showed that MPP⁺, a neurotoxin which models Parkinson's disease in vitro, mediated calpain activation. Calpain, a protease, proteolytically processes substrates to transform and modulate their structures and activities rather than a complete degradation.</p> <p>This year's project examines the effect of licorice on calpain activation in the mouse hippocampus.</p> <p>Methods/Materials The hippocampal slices of two male CAFI (calpain activity monitored by FRET imaging) mice were soaked in a licorice solution of 2 ml licorice extract and 10 ml of aCSF (artificial cerebrospinal fluid). After a 30 minute soaking period, the slices were subjected to sonic dismembration. A spectrofluorometer was used to view calpain activity through FRET (fluorescence resonance energy transfer) imaging.</p> <p>Results The results from the data show no licorice-mediated calpain activation, and licorice is not involved in calpain-modulation of synaptic plasticity. I found there was a slight decrease in the fluorescence emitted; however, these findings should be further investigated to be quantifiable.</p> <p>Conclusions/Discussion The results of this study are consistent with the hypothesis and show that there is no licorice-mediated calpain activation. Calpain activation has numerous effects, such as partial proteolysis, that creates neurodegeneration. The property that distinguishes calpain from other proteases is that it does not completely degrade its substrates into inactive fragments; instead, it produces a partial proteolysis that usually changes the function of the proteins. In the central nervous system, calpain has been involved in cell migration, axonal growth, neurodegeneration, and synaptic plasticity.</p>	
Summary Statement My study investigated the effect of <i>Glycyrrhiza glabra</i> (popularly known as licorice) on calpain activation in the mouse hippocampus.	
Help Received I used the lab equipment at the University of Southern California and was mentored by Professor Michel Baudry and Sohila Zadran.	