



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Jessie L. Gan	Project Number J0502
Project Title Natural Antioxidant and Nano-Antioxidant Effects against Oxidative Stress	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which natural and nano-antioxidant are the most efficacious in <i>Saccharomyces cerevisiae</i> against oxidative stress. The natural antioxidants studied were Catechins in Green Tea, Allicin in Garlic, Glutathione, and Vitamin C, and the nano-antioxidants were MitoQ, Carbon-60 (C60), and Gold Nanoparticles. I hypothesized that Green Tea is the best natural antioxidant due to its large resonance, and MitoQ is the best nano-antioxidant since it targets ROS at the mitochondria.</p> <p>Methods/Materials The antioxidants were tested in 5 concentrations against hydrogen peroxide-induced oxidative stress in yeast, (ranging from 1.56 to 25 mg/ml for natural antioxidants, and 0.03125 to 0.5 mg/ml for nano-antioxidants) and were compared with 3 controls of yeast only, yeast and antioxidant, and yeast with hydrogen peroxide. The yeast optical density for each solution was measured using a handheld colorimeter from Hanna Instruments, before and after a 24 hour incubation period. A total of 3 trials were conducted for each antioxidant, where each trial consisted of these 8 solutions, and 5 samples of each.</p> <p>Results The results showed that Green Tea and C60 were the most effective natural and nano-antioxidants, which counter oxidative stress at 3.125 mg/ml and 0.25 mg/ml respectively. The results also displayed pro-oxidative effects in other antioxidants.</p> <p>Conclusions/Discussion Green Tea was highly efficacious because of its large polyphenol resonant structure and ability to carry out hydrogen atom transfer to free radicals. C60 fullerene was competent due to its extremely stable 60 interlinked carbon atoms molecular structure and targeted ability to mitochondria. Hence C60 nano-antioxidant, if combined with Green Tea Catechin into a super-antioxidant, could prove to be a promising therapy for oxidative stress diseases.</p>	
Summary Statement My project investigates the effects and efficacies of natural antioxidants and nano-antioxidants against oxidative stress in the model organism <i>Saccharomyces cerevisiae</i> .	
Help Received Dr. Eisen helped me with graphs and gave me advice on poster display, and my mom assisted with purchasing of materials and gave encouragements.	