



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Varun S. Sharma	Project Number S1211
Project Title The Effect of Exercise on Anxiety and the Possible Role of Basal Ganglia Function	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Question: Does Exercise Effect Sensorimotor Gating and Anxiety?</p> <p>Hypothesis: Exercise reduces anxiety and improves the ability to process information.</p> <p>Methods/Materials I placed 20 mice into individually housed cages with access to a spinning wheel. 10 mice were exercised and 10 mice were non-exercised. Wheels were locked for the non-exercised mice. After 2 weeks of the study, I conducted two tests to evaluate Anxiety and Sensorimotor Gating: Acoustic Startle Testing and Pre-Pulse Inhibition Startle Testing.</p> <p>Results</p> <ol style="list-style-type: none">1. Exercise reduced anxiety in the C57 black strain mouse population based on results from the Startle Testing data.2. Exercise reduced anxiety in the C57 black strain mouse population based on results from the Pre-Pulse Inhibition Testing data. <p>Conclusions/Discussion To quantitatively measure neurological benefits of exercise is difficult. In the exercise study I conducted this past summer, I found that the C57 Black Strain mice exhibited lower levels of anxiety based on results of the Pre-pulse Inhibition and Startle Testing. These results suggest that there are likely discrete effects of exercise that are transmitted to the brain that result in reduced anxiety. As the basal ganglia plays a critical role in the startle response these tests are an in-direct measure of basal ganglia function. Exercise is also known to stimulate muscle growth via a process called mitochondrial biogenesis. The results of the study suggest that exercise improves basal ganglia function possibly via increased mitochondrial biogenesis in the brain. Exercise may therefore play an important role in improving neurological function in a manner similar to improving muscle function.</p>	
Summary Statement In the study conducted, I found that Exercise improved neurological activity, specifically Anxiety and Basal Ganglia function.	
Help Received Used lab equipment at University of California San Diego under the supervision of Dr. Victoria Risbrough. Also received advice and discussion to conduct exercise protocols in mice, training to conduct behavioral experiments and technical help for trouble-shooting problems.	