



# CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

<b>Name(s)</b> <b>Lily Denesha</b>	<b>Project Number</b> <b>J2209</b>
<b>Project Title</b> <b>It's Shocking!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The object of this project is to determine how well commercial tennis racket shock absorbers work.</p> <p><b>Methods/Materials</b> Tennis racket handle vibrations were measured by affixing a pen as a stylus to the racket grip and clamping the racket to a fixed object so that it vibrated when impacted by a dropped tennis ball. Transparency paper was positioned against the pen so that a line was scribed on the transparency that was determined to be proportional to the vibration. Ten tests were made with and without the shock absorbers to determine their effectiveness in low velocity impacts. Higher velocity tests were made using a "tennis cannon" that achieved tennis professional level ball velocities over 100 mph. A "homemade" non commercial shock absorber was also tested to see how big an absorber had to be to provide a significant shock reduction benefit.</p> <p><b>Results</b> A 0.656% vibration reduction was measured in the low ball velocity tests.</p> <p>Results of high ball velocity testing are pending. Results of large absorber testing are also pending.</p> <p><b>Conclusions/Discussion</b> Tennis racket shock absorbers are popular accessories in nearly all tennis circles. They are small, inexpensive (most are less than \$2.00), plastic or rubber devices slightly larger than a thumbnail. They are placed the strings of the racket near the base of the face to provide sound and vibration dampening. Inventors of these devices claim reductions in vibration and noise but offer little or no science to prove the extent of these reductions.</p> <p>My conclusion is that commercial tennis racket shock absorbers provide minimal benefit in low velocity impacts. Since the cost is low and there may be other benefits besides those that are measured (such as noise reduction and placebo effects) they are probably worth putting on a racket. The small gain may also become significant over time considering the cumulative effects of hundreds or thousands of impacts to the "tennis elbow" and other parts of the body.</p> <p>Conclusions regarding reducing vibration in higher velocity impacts are pending current testing with a recently constructed "tennis cannon."</p>	
<b>Summary Statement</b> The object of this project is to determine how well commercial tennis racket shock absorbers work.	
<b>Help Received</b> Father helped setup the measuring stick and construction of the "Tennis ball Cannon"	