



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

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<b>Project Title</b> <b>A Prospective Study on the Effect of Strength and Flexibility Conditioning on the Velocity of a Tennis Serve</b>	
<b>Objectives/Goals</b> The objective of my experiment was to determine if building rectus abdominis muscle strength or increasing wrist flexion over a period of 6 weeks improves tennis service velocity. <b>Abstract</b> <b>Methods/Materials</b> 9 male test subjects were given questionnaires and informed consent forms. They were then randomized into 3 groups: trunk exercise, wrist exercise, and control. The subjects each served 5 serves at maximum velocity into the correct service box. Velocity, in miles per hour, was measured using a radar gun. During the experiment, the subjects in the trunk exercise group did 60 sit-ups each day. The maximum number of continuous sit-ups they were able to do was recorded. The subjects in the wrist exercise group did 3 minutes of wrist flexion extension stretching each day. Their maximum degree of wrist flexion was measured using a goniometer. After the initial baseline test, all measurements were repeated every 2 weeks for a time period of 6 weeks. <b>Results</b> The average service velocity of the trunk group increased from 90.1 mph to 91.7 mph (+0.8%). Their average maximum number of sit-ups changed from 104 to 131. The average service velocity for the wrist group increased from 86.3 mph to 88.4 mph (+2.5%). Their average wrist flexion improved from 60.7 degrees to 80.7 degrees. The average service velocity of the control group decreased from 84.9 mph to 81.7 mph (-3.8%). <b>Conclusions/Discussion</b> The results met the objective; they supported the hypothesis. Both experimental groups showed improvement in service velocity. Each group also demonstrated physical progress because of their respective conditioning regimens. The wrist exercise group showed a larger percentage of improvement in service velocity. Several uncontrolled variables that may have caused inaccurate results are temperature, fatigue, noncompliance in the exercise routines, and imprecise measurements.	
<b>Summary Statement</b> This experiment demonstrates the positive effects certain types of conditioning can have on the velocity of a tennis player's serve.	
<b>Help Received</b> My mother assisted with scheduling dates for subject testing. Mrs. O'Donnell and my father guided data collection, organization, and analysis.	