



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Sarah L. Nothnagel	<b>Project Number</b> <b>S0521</b>
<b>Project Title</b> <b>Do Acids in Sodas Weaken Orthodontic Bonds?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Three questions were to be answered in this project: 1) Do sodas weaken orthodontic bonds?; 2) Is phosphoric acid in the sodas the reason for weakening?; and 3) Are some sodas worse for bonds than others?</p> <p><b>Methods/Materials</b> Approximately 100 screws were bonded to bovine teeth with orthodontic cement to simulate the bond between orthodontic brackets and human teeth. These orthodontic bonds were exposed to water, four sodas, 4.46 mM phosphoric acid, 100 mM phosphoric acid, or 100 mM citric acid. The break strength of these bonds was tested at three intervals by suspending each tooth on a platform, hanging a bucket on the screw, and adding sand to the bucket until the bond broke.</p> <p><b>Results</b> The bonds exposed to water, the sodas, and the lower concentration phosphoric acid showed no significant weakening in bond strength over time. The higher concentration acids did show weakening over time, though.</p> <p><b>Conclusions/Discussion</b> The data from this experiment suggest that sodas do not weaken orthodontic bonds and that there is no appreciable difference between sodas. Phosphoric acid does weaken orthodontic bonds, but only at levels far higher than in soda.</p>	
<b>Summary Statement</b> This project examines the effects of acids found in sodas on orthodontic bonds.	
<b>Help Received</b> Grandfather helped get teeth; father obtained other materials, helped prepare teeth	