



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> <b>Shay C. Edwards</b>	<b>Project Number</b> <b>S1003</b>
<b>Project Title</b> <b>Thermographic Assessment of Cold Stimulation on Autonomic Vascular Reactions</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to determine the potential usefulness of thermal imaging technology to evaluate and monitor autonomic vascular reactions, and to establish whether thermal imagery can be used to effectively detect pre-clinical stages of circulatory problems.</p> <p><b>Methods/Materials</b> To test my hypothesis as to the effectiveness of thermography as a useful tool for assessing autonomic vascular reactions a cold stimulation test was performed on 60 participants using a radiometric thermal imager. The participants included diabetics, smokers, and a normal/control group (no known health issues). The test consists of participants placing their left hand in <math>62^{\circ}\text{F} \pm 2^{\circ}</math> water for 20 minutes while the right hand was placed on a wood surface. The participants were also asked to keep the left hand moving while it was submerged in the cool water. Participants were also asked to keep their right hand in a flat comfortable position and to keep movement to a minimum. A thermal image was recorded of the right hand every 5 minutes starting with a preliminary test image.</p> <p><b>Results</b> Three groups of people were clearly defined by the thermal imager. The diabetic group had no visible thermographic finger tip change while the overall average temperature did decline slightly by an average of <math>2^{\circ}\text{F}</math>. The smoker group had an extremely mottled and uneven thermographic appearance of all fingers and hand with a slight decline initially in temperature while rising <math>2^{\circ}\text{F}</math> and holding constant until the end of the 20 minute test period. The normal/control group thermographic assessment of the circulatory system showed that the right hand was significantly affected, with a steady decline in surface temperature as much as <math>10^{\circ}\text{F}</math> (average of <math>8^{\circ}\text{F} \pm 2^{\circ}</math>) and beginning with very visible thermographic finger tips to almost non visible appearance at the end of the 20 minute test period.</p> <p><b>Conclusions/Discussion</b> Using three defined groups amazingly showed clear differences in circulation. The data from the test supports my hypothesis that thermal imaging can be a useful tool for examining circulation.</p>	
<b>Summary Statement</b> Thermography simply identifies thermal anomalies using an infrared imager. This research proves that thermal imaging can be used effectively to detect pre-clinical stages of circulatory problems.	
<b>Help Received</b> So Cal Edison loaned me the thermal imager.	