



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Brian R. Scott</b>	<b>Project Number</b> <b>J1318</b>
<b>Project Title</b> <b>Step It Up: Can Pulse Oximetry During Breath Holding Predict One's Level of Physical Fitness?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I wanted to see if there is a correlation between decline in oxygen saturation during breath holding as measured by pulse oximetry, and an individual's level of physical fitness as estimated by 48 hour pedometer readings. I predicted that the subjects with the least amount of daily activity would have the most rapid drop in oxygen saturation.</p> <p><b>Methods/Materials</b> I obtained informed consent from 15 subjects, 9 males and 6 females, ranging in age from 10 to 71. I asked them about their exercise habits. The subjects used pedometers to record the amount of steps taken over 48 hours. Their baseline oxygen saturation was measured by a finger pulse oximeter. They then took a normal breath, held it for 30 seconds, exhaled, and immediately repeated that for a total of 4 times (2 minutes). The oxygen saturation was recorded every 30 seconds for a duration of 2 minutes and 30 seconds. The time at which the oxygen saturation dropped by 2 percent was noted.</p> <p><b>Results</b> The average steps taken over the 48 hour period were 13,678. The average time to a 2% oxygen saturation drop was 57.1 seconds. Subjects who did ordinary activity had a 2% oxygen saturation drop at 34.5 seconds, those who did moderate activity dropped at 41.4 seconds, and those who did aerobic (long distance) training dropped at 90 seconds. Analysis of steps taken and oxygen saturation decline over 2 minutes showed that those who took the most steps had the slowest decline in oxygen saturation.</p> <p><b>Conclusions/Discussion</b> My results showed that using a pulse oximeter to measure decline of oxygen saturation during breath holding does correlate with activity levels as measured by a pedometer. This novel, simple, and inexpensive test could help measure one's level of physical fitness, and may be useful in settings such as schools, the military, and doctors' offices.</p>	
<b>Summary Statement</b> The rate of decline in oxygen saturation during breath holding can predict one's level of physical fitness.	
<b>Help Received</b> Father loaned me a pulse oximeter and supervised; mother bought the pedometers; 15 subjects volunteered their time.	