



# CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

<b>Name(s)</b> <b>Ryan A. Robie</b>	<b>Project Number</b> <b>J1125</b>
<b>Project Title</b> <b>Spirobics: Airflow Resistance and Its Response to Exercise</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my project was to determine if the changes in airflow resistance that occur in breathing conditions such as exercise-induced wheezing can be objectively measured. I hypothesize that a screening procedure that combines pulmonary function testing with an aerobic exercise challenge can identify children who experience airflow limitation during aerobic exercise.</p> <p><b>Methods/Materials</b> To test my hypothesis I first obtained completed surveys from 21 eighth grade students about how exercise affects their breathing. The respondents pulmonary function flow rates were measured with two trials of spirometry testing before and after a six minute aerobic exercise challenge. The spirometry measuring system included disposable mouthpieces/flowsensors and printed test results. A stopwatch timed the exercise period. Pulse oximetry was used to obtain heart rates. All results were recorded on a data chart for analysis.</p> <p><b>Results</b> The final data analysis represented 16 of the participants tested that had valid spirometry results per review by the medical research advisor, a pulmonologist. The forced expiratory volume in one second (FEV1) was the primary outcome variable used in determining the presence of exercise-induced air flow limitation expressed physiologically as airway resistance. Results were then compared with the initial screening questionnaires to determine any correlations. Three students who subjectively screened positive on their survey for "wheezing with exercise" and "exercise limitation", also met the objective criteria defining airflow limitation in their test results.</p> <p><b>Conclusions/Discussion</b> The correlation obtained from the data in my testing results when compared with the initial survey screening validates my hypothesis. It suggests that a subjective survey of how exercise affects ones breathing would prove more beneficial in screening for exercise-induced airflow limitation if it is substantiated with the results of an objective testing regimen. In conclusion, a simple verifiable testing procedure that combines spirometry testing with an aerobic exercise challenge ("Spirobics") might prove useful to objectively identify students who experience airflow limitation during aerobic exercise. Information obtained from evaluations using this methodology might aid pediatricians or school health clinics in the early intervention of suspected exercise-induced airway reactivity in children.</p>	
<b>Summary Statement</b> My project demonstrates that an objective testing method combining pulmonary function spirometry testing with an aerobic exercise challenge ("Spirobics") can be used to identify children with suspected exercise-induced airflow limitation.	
<b>Help Received</b> Dr. Melvin Selinger was my medical research advisor. My parents, both respiratory therapists, and my P.E. teacher, Emily Howatt assisted me in the testing process at Sunny Brae Middle School. St. Joseph Hospital provided the spirometry testing system and pulse oximeter. My dad was my research director.	