



CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

Name(s) Amanda L. Mundell	Project Number J1018
Project Title The Effect of Athlete's Heart Syndrome on Pulse Pressure	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Pulse pressure (the difference between systolic and diastolic blood pressures) is recognized as a leading predictor of stroke and heart attack risk. For every ten point increase in pulse pressure, there is a twelve percent increase in mortality. I hypothesized that, for middle-aged or elderly individuals, pulse pressure would tend to increase with the development of athlete's heart syndrome (enlargement of the left ventricular cavity, dramatically slowed heart rate, and increased cardiac efficiency resulting from sustained aerobic conditioning).</p> <p>Methods/Materials The diastolic and systolic blood pressures of a number of middle-aged and elderly athletes were recorded and compared to their resting heart rates. The subjects were screened to ensure they were not taking blood pressure medication. A history was obtained to rule out sinus bradycardia and ensure that true athlete's heart syndrome was present. Several youthful athletes were also tested as a control group. One middle-aged former athlete with hypertension was followed for several months, during which he engaged in strenuous aerobic conditioning to reduce his heart rate, and then became sedentary, allowing his heart rate to return to normal. The subject's resting heart rate, diastolic pressure and systolic pressure were measured at intervals during this time and averaged.</p> <p>Results Those middle-aged and elderly athletes who had clear athlete's heart syndrome (a resting heart rate of 45 beats per minute or below) had an average pulse pressure of 54.7 mm Hg. Those with "normal" resting heart rates (60 beats per minute or above) had an average pulse pressure of 38.5 mm Hg.</p> <p>Conclusions/Discussion The results confirmed the hypothesis. Middle-aged and elderly subjects with athlete's heart syndrome exhibited increased pulse pressure compared to subjects with "normal" hearts. Because increased pulse pressure is recognized as a leading contributor to heart attack and stroke, the results of this experiment suggest that middle-aged or elderly persons, particularly those with pre-existing hypertension, should be careful not to "overdo" it when embarking on an exercise program. If they exercise too vigorously for an extended period of time, they could develop athlete's heart syndrome, or something close to it, which could lead to a dangerously widened pulse pressure.</p>	
Summary Statement My project looked for a link between the development of athlete's heart syndrome and widened pulse pressure, in order to determine whether sustained, vigorous aerobic exercise might be dangerous for middle-aged or elderly people.	
Help Received My parents drove me to running and cycling venues to test athletes and to the library. I interviewed Robert Millhouse, M.D. regarding the heart. I interviewed engineer Douglas DeVries regarding fluid mechanics. Dad bought me a sphygmomanometer.	