



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sanjna Ghanshani</b>	<b>Project Number</b> <b>J1310</b>
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**Project Title**  
**Association between Heart Disease Risk Factors and Elevated CRP Suggests Lifestyle Changes May Well Avoid Statin Drugs**

**Abstract**

**Objectives/Goals**  
A recent report in NEJM revealed that apparently healthy people with normal cholesterol but high levels of C-reactive protein (CRP) in their blood can significantly reduce their risk of heart attack by taking cholesterol-lowering statins. CRP is produced by the liver in response to inflammation and there is overwhelming evidence that atherosclerosis, hardening of the arteries which leads to heart disease, is an inflammatory disease. Though high CRP levels are linked to atherosclerosis, it is unknown whether CRP is merely a sign of cardiovascular disease or if it involved in causing disease. I wanted to determine the prevalence of elevated CRP in the population and investigate its association with known risk factors for heart disease such as high blood pressure, diabetes, obesity, high cholesterol, tobacco/alcohol use, and lack of exercise. Even in seemingly healthy people there is likely to be a correlation between high CRP levels and these risk factors.

**Methods/Materials**  
Blood was drawn by a certified phlebotomist from consenting volunteers. Information about each donor's physical state (height/weight/waist circumference), medical history (health condition/medications), and lifestyle (exercise/alcohol consumption/cigarette use) was also collected in a questionnaire. Following separation, serum from each sample was run in a commercially available high-sensitivity CRP assay along with 6 standards with known quantities of CRP. Based on a reference curve, the amount of CRP in the serum of each donor was determined and plotted against all of the risk factors for cardiovascular disease.

**Results**  
CRP levels were noted to be elevated in adults with a history of high blood pressure, high cholesterol, diabetes and those who were overweight (high BMI) and had abdominal obesity (large waist circumference). Individuals consuming alcohol at least 1-2 times/week had relatively lower CRP levels. At least in this test population, no correlation between high CRP levels and smoking or physical inactivity was apparent.

**Conclusions/Discussion**  
Though this study represents a small sampling of the general population, there is a trend of higher CRP levels in individuals at higher risk of cardiovascular disease. Thus, it may be more prudent to treat those risk-factors aggressively or modify one's lifestyle before committing someone to life-long statin therapy which is expensive and has potential for adverse side-effects.

**Summary Statement**  
The observed association between modifiable risk factors for heart disease and elevated C-Reactive Protein (CRP) suggests that a healthy lifestyle could keep CRP levels in check and avoid dependence on prolonged statin therapy.

**Help Received**  
Serum from human donors as well as their medical history was provided by Dr. Menal Borsada at San Judas Medical Clinic, LA. My father purchased the high-sensitivity CRP assay kit from BioCheck, Inc. Use of small equipment and the microplate reader was facilitated by Ms. Ramilla Lewis at Allergan.