



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Onkar S. Sandhu	Project Number S1216
Project Title Optical Coherence Tomography in Acute Coronary Syndrome	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To study the prevalence of plaque rupture, plaque erosion, and fibrocalcific nodule in culprit lesions defined by optical coherence tomography in male and female patients presenting with acute coronary syndrome.</p> <p>Methods/Materials Twenty-six patients presenting with acute coronary syndrome to Community Regional Medical Center at Fresno and an identifiable culprit lesion on angiography were studied with the novel imaging technique of optical coherence tomography (OCT). The OCT procedure was performed successively after the initial coronary angiogram and before the placement of a coronary stent, if vessel(s) were not totally occluded. Using the frequency-domain C7XR OCT system, a 2.7-F OCT imaging catheter was carefully advanced distal to the culprit lesion. The automated pullback was performed at 20 mm/s, while blood was displaced by a short injection of Iodine contrast media through the guiding catheter. Risk factors and patient information associated with coronary heart disease were collected, including age, sex, smoking history, family history of heart disease, history of hypertension, and history of diabetes. Standard deviation for each variable was calculated. Student t-test, Pearson's chi-squared test, and Fisher's exact test were performed to compare the means of the sampled data.</p> <p>Results Plaque rupture was associated with acute coronary syndrome in 61% of patients, while plaque erosion was seen in 39 % of patients, which is statistically significant ($p < 0.05$). Plaque erosion was more prevalent in women (60%) as compared to men, who have higher occurrence of plaque rupture (69%) with statistical significance ($p < 0.05$). Smokers have higher incidence of plaque erosion (80%) as compared to plaque rupture (44%), which is statistically significant ($p < 0.05$).</p> <p>Conclusions/Discussion This study determined plaque rupture is more commonly associated with acute coronary syndrome as compared to plaque erosion. Women tend to have more plaque erosion as compared to men, who have higher incidence of plaque rupture. Smokers have higher prevalence of plaque erosion as compared to plaque rupture. Identifying the pathways in the etiopathogenesis of acute coronary syndrome may provide crucial understanding about coronary heart disease process; thus, the targeted therapy can be established. This understanding may further help to prevent the occurrence of coronary heart disease in the first place.</p>	
Summary Statement Optical coherence tomography, a novel imaging technique, can be performed to determine the plaque morphology of coronary plaque in acute coronary syndrome.	
Help Received Research performed under the guidance of Dr. John Ambrose, Dr. Bipin Joshi, and Dr. Manjunath Harlapur at University of California, San Francisco at Fresno.	