



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kevin K. Lee	Project Number S1205
Project Title Utility of the Spatial Peaks QRS-T Angle in Distinguishing Left Ventricular Hypertrophy from Athletic Heart Syndrome	
Abstract Objectives/Goals This project proposes the spatial peaks QRS-T angle as a new method of distinguishing left ventricular hypertrophy (LVH) from athletic heart syndrome (AHS). These two very different conditions (one indicates high risk for sudden death, the other an athlete in good shape) appear identical on the standard 12-lead EKG, implying the need for a more accurate method of diagnosis. Methods/Materials Double blind tests were conducted on athlete and LVH groups using traditional techniques (Sokolow-Lyon and Cornell indices) the spatial peaks QRS-T angle. After computing the parameters, diagnoses were made by comparing the respective values of the calculated parameters to the normal limits, then sensitivities and specificities were computed and compared to determine the relative utilities of the two methods. Results The ranges of angles for the LVH and athlete sets were clearly distinct, with the angles in the LVH group significantly larger. For the traditional methods, the ranges for the two data sets presented significant overlap and ambiguity. Both sensitivity and specificity were higher for the spatial peaks QRS-T angle than for the traditional parameters. Conclusions/Discussion The spatial peaks QRS-T demonstrated superior utility over traditional methods in distinguishing LVH from AHS. Also, it resolved ambiguity from the traditional methods explicitly. The angle not only holds great potential to detect cases of LVH that may have previously gone unnoticed, but it also reduces the need for expensive subsequent testing by virtue of its increased specificity. Additionally, it would be inexpensive to implement in clinics since no new hardware is required.	
Summary Statement My project devises an improved method for screening athletes by expanding the electrocardiogram to three dimensions in order to reveal potentially important insight.	
Help Received Dr. Cortez helped clarify explanations in justification of procedure, supervised use of EKG machine, and provided several data sets; Mr. Smay helped revise report and gave advice on display and presentation.	