



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Krikor Bornazyan</b>	<b>Project Number</b> <b>J0805</b>
<b>Project Title</b> <b>Modified Electrode Placement for 12-Lead Electrocardiogram</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Is 12-lead modified-torso electrode ECG interchangeable with standard 12-lead ECG? Based on my research, I hypothesized that modified-torso method will result in diagnostic interpretations different from standard because electrical signals obtained from the body will vary depending on electrode placement on the body.</p> <p><b>Methods/Materials</b> The study compares diagnostic outcome of two sequential 12-lead ECGs in 24 adult patients, one being taken with approved standard and the other with modified-torso methods.</p> <p><b>Results</b> Modified-torso method produced important amplitude and waveform changes associated with shift of the P, T and QRS frontal plane axes, particularly in those with abnormal standard ECGs. Such changes generated important diagnostic interpretation differences in 46% of patients with abnormal standard ECGs, making abnormalities disappear in 4 patients resulting in normal ECGs, and in 2 patients changing diagnostic outcome of abnormalities. Torso method also caused clinically important frontal axes changes in one patient with normal standard ECG.</p> <p><b>Conclusions/Discussion</b> Modified-torso method resulted in diagnostic interpretations different from standard because electrical signals obtained from the body varied depending on electrode placement on the body. It is vital that ECGs should be acquired in the standard way unless there are particular reasons for not doing so like reducing limb movement artifacts, increasing speed of application in emergency by minimizing undressing and any modification of electrode placement must be reported on the ECG itself. Data fully supported the hypothesis. Findings agree with the information found in the literature.</p>	
<b>Summary Statement</b> By comparing 12-lead modified electrode ECGs with standard in 24 patients, it was shown that first method produced important waveform changes causing diagnostic interpretation differences, therefore these methods are not interchangeable.	
<b>Help Received</b> Consulting, transportation to obtain necessary materials and literature. Glendale Adventist Medical Center provided equipment and lab.	