

# Decreased Depolarization Vector Magnitude May Help Identify Events in Patients with Long QT Syndrome

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## Introduction:

All Long QT syndrome (LQTS) patients possess elevated risk for channelopathy-induced delayed myocardial repolarization and consequently potentially life-threatening cardiac events with 90% of initial cardiac events occurring between preteen and 40 years old. Utilizing ECG and derived vectorcardiographic parameters, including T wave Vector Magnitude (TwVM) measurement data, this study attempts to determine whether TwVM from baseline ECGs is effectively predictive of future cardiac events for genotype-positive LQTS patients.

## Methods:

Verified carriers of established LQTS disease-causing genotypes were selected from University of Minnesota patient encounters between 2010-2020 for inclusion in this retrospective study. Baseline and predictive ECG and derived vectorcardiographic parameter evaluation, clinical data, and statistical analysis were compared between patients with cardiac events and patients without.

## Results:

Of 41 participants, 15 experienced cardiac events and 26 did not. While many baseline electrocardiographic parameter measurements did not show significant differences between patient groups, vectorcardiographic parameters at baseline, particularly the QRS vector magnitude (QRSVM) and azimuth of the spatial ventricular gradient, showed significance. Additionally, final vectorcardiographic parameters, particularly the QRSVM, TwVM, and azimuth of the spatial ventricular gradient showed significant differences between patients groups. Final T-wave frontal axis was significantly larger in those without cardiac events. Significant Kaplan-Meier separation between patient groups was noted based on a QRSVM of 1.43mV or lower, with additional consideration to patient age, genotype, and beta blocker use.

## Conclusion:

This study shows evidence of ECG and derived vectorcardiographic parameters, including TwVM, being effective in early prediction of cardiac events in genotype-positive LQTS patients.