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When Are 3 ECG-Leads Better Than 12? Streamlining and Optimizing ECG Assessment in Sudden Death Prediction

Prolonged Tp-e and QT intervals on the 12-lead electrocardiogram (ECG) are associated with increased risk for sudden cardiac death (SCD). However, there is no current consensus on which of the 12 leads is the most sensitive measure for Tp-e and QT intervals. The aim of this study was to measure all 12 ECG leads and to analyze whether there are leads that are most sensitive to detect prolongation of Tp-e and QT intervals, to optimize methodology for future investigations. Fifteen healthy volunteers (F/M 6/9; mean age 25 yrs) were included in our study. We recorded the 12-lead ECG for 5-minutes. QT is the interval from QRS complex onset to the end of the T-wave. Tp-e is the interval from the T-wave peak to the end of the T-wave. Using commercially available software, five outcomes, Tp-e interval, Tp-e/QTc, Tp-e/QTc intervals, and the QT, QTc intervals, were determined. The sum of leads V2, V3 & V4 yielded the highest % maximum value for outcomes with Tp-e (79.7% CI 69.4, 89.9%) vs other leads ($p=0.007$). The sum of leads AVL, AVR, and III yielded the highest percentage of maximum values for outcomes QT and QTc (70.6% CI 59.8, 81.4%) vs other leads ($p=0.00006$). Two of the leads, V5 and V6, never had a maximum value for any outcome. Preliminary findings in our study suggest that investigators should focus on leads V2, V3 & V4 to detect prolongation of Tp-e intervals and leads AVL, AVR & III for prolongation of QT intervals when investigating their associations with SCD.