Ultra-Short Beat-to-Beat Repolarization Variability Predicts Cardiovascular Events in Individuals Without Cardiovascular Disease

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The beat-to-beat variability of the QT interval is thought to be a measure of sympathetic activity directed to the heart and it has predictive value in cardiac patients. However, the predictive value of QTV in the general population is unclear. This study aimed to determine the association between ultra-short QTV and future major adverse cardiovascular events
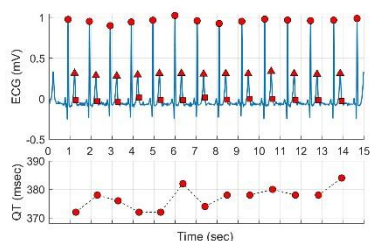

Figure 1. Example of 15-sec ECG

(MACE) in a large cohort of middled aged individuals without previous cardiovascular disease. QTV was measured using the QTV index (QTVI), and the short-term QTV (STVQT) in n=55,765 UK Biobank participants (54% female, 56.6±8.2 years old) who underwent a 15-sec single-lead ECG. The beat-to-beat variability of Q-Tpeak and Tpeak-Tend intervals was also assessed, and heart rate variability (RMSSD) was estimated for comparison. According to hospital episode statistics, after a median follow-up of 12.5 years, n=2,542 (4.6%) MACE, including myocardial infarction, heart failure and life-threatening ventricular arrhythmia, occurred. QTVI and STVQTV were associated with MACE and the association remained significant after adjusting for age, sex, body mass index, diabetes, hypertension, smoking, beta-blockers, and, for STVQTV only, QT interval, resting heart rate, and heart rate variability. QTVI showed the higher hazard ratio (1.10 (1.06, 1.15), p<0.01) and it was associated with MACE also when based on Q-Tpeak and Tpeak-Tend intervals. This study demonstrates for the first time that in the general population ultra-short repolarization variability from 15-sec ECG predicts MACE independently of traditional risk factors. This suggests that standard clinical ECGs and wearable-ECGs may identify individuals at higher risk of cardiac disease, which has important ramifications for novel population-based preventative strategies.