

# QT interval adaptation to heart rate is impaired in pediatric epilepsy following status epilepticus

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## Submission No:

6037

## Type:

Abstract

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## Introduction:

QT interval adaptation to heart rate (QT dynamics) represents a fundamental electrophysiological observation. Impaired QT dynamics have been observed in cardiac disorders with propensity for ventricular arrhythmias, possibly reflecting an increased arrhythmic risk. Here we sought to investigate whether status epilepticus (SE) could alter QT dynamics and to identify potential contributing factors in children.

## Methods:

We retrospectively reviewed Texas Children's Hospital emergency center (EC) visits with primary diagnosis of SE from 1/1/2011 to 12/31/2013. 12-lead EKG were included if: 1) obtained within 24 h of EC visit, 2) no cardiac medications, 3) no history of heart disease or ion channel defects. Children with SE were categorized as epileptic (E, n=14) or non-epileptic (NE, n=16). Age, gender and ethnicity-matched control children (C, n=30) met the inclusion criteria and had no seizure history. Ten QT and RR intervals per EKG were manually measured from Lead II. QT dynamics were assessed by the QT/RR relationship using linear regression analysis. Comparisons of clinical factors between epileptic and non-epileptic groups were performed using Student t test or Fisher exact test. Values are expressed as mean±SEM.

## Results:

Of the 435 children presenting with SE, 30 met inclusion criteria. Compared with control, SE groups had weaker linear QT/RR relationship (C:  $r^2 = 0.83$ , NE:  $r^2 = 0.66$ , E:  $r^2 = 0.61$ ). The epileptic group also had a flatten slope (C:  $0.29 \pm 0.01$ , NE:  $0.28 \pm 0.02$ , E:  $0.17 \pm 0.01$ ,  $p < 0.0001$ ). Between epileptic and non-epileptic groups, we observed no differences in clinical factors except age (NE:  $25.9 \pm 8.9$  mo, E:  $90.8 \pm 19.0$  mo,  $p < 0.01$ ), SaO<sub>2</sub> (NE:  $99.7 \pm 0.2\%$ , E:  $97.1 \pm 0.9\%$   $p < 0.01$ ), and chronic anti-epileptic drugs (AED) use at presentation to EC.

**Conclusions:**

We found that children with epilepsy exhibited impaired QT dynamics following SE, possibly mediated by age, SaO2 and chronic AED use. Decreased QT adaptation to heart rate may be a predisposing factor to arrhythmias. Studies are ongoing to further examine the contribution of epilepsy-related factors to the observed changes in QT dynamics.

**General Classification:**

Clinical Research

**Patient Type:**

Pediatric

**Categories:**

Neuroscience

**Keywords:**

cardiac

electrophysiology

status epilepticus