

## **AUTONOMIC CHANGES FOLLOWING GENERALIZED TONIC CLONIC SEIZURES: AN ANALYSIS OF ADULT AND PEDIATRIC PATIENTS WITH EPILEPSY**

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### **RATIONALE:**

Following a generalized tonic clonic seizure (GTCS), some patients develop a period of post-ictal generalized electrical suppression (PGES) which may be associated with autonomic changes. Studies have proposed a correlation between the duration of PGES and the risk for sudden unexplained death in epilepsy (SUDEP). The degree of autonomic dysfunction during and after a seizure has also been linked to SUDEP. The effect of the patient's age on the post-ictal autonomic response following a convulsion remains unclear and is the main focus of this study.

### **METHODS:**

Patients admitted to the epilepsy monitoring units at Boston Children's Hospital and Brigham and Women's Hospital were prospectively recruited. Patients received a wireless wrist sensor during the duration of their admission to measure electrodermal activity (EDA). Only patients with a captured generalized tonic clonic seizure were included, and only the first GTCS was analyzed. Variables collected included: epilepsy related information (epilepsy duration, seizure frequency, medication regimen, epilepsy classification, and neuroimaging), seizure related information (seizure duration, duration of clonic component, duration of PGES), and EDA data (amplitude, area under the curve, area under the curve of the rising portion of EDA).

### **RESULTS:**

A total of 15 patients were prospectively enrolled with an average age of 30.6 years (9-67), and average epilepsy duration of 12.4 years (1-51). The average seizure frequency was 6.6 seizures per month (0.2-30) and an average of 2.0 GTCS per year (0-12). The median anti-seizure medication number was 2. Thirteen patients (87%) had focal epilepsy, 2 patients had generalized epilepsy, and one patient had multifocal epilepsy. Of the 14 available MRIs reviewed, 9(64%) were lesional. The average seizure duration was 178.4 seconds (75-694), the average duration of the clonic component was 105.9 seconds (34-389), the average PGES duration was 68 seconds (0-338), and the average amplitude of EDA was 8.15 micro-Siemens (0.60-20.95). Using linear regression a positive correlation was found between age and duration of PGES ( $p=0.025$ ), logAUC ( $p=0.0059$ ), log-rise of AUC ( $p=0.01$ ), but not amplitude of EDA ( $p=0.389$ ). Duration of PGES also correlated positively with all EDA variables. No correlation was found between seizure duration and EDA variables.

### **CONCLUSIONS:**

Duration of PGES following a GTC is age related, with older patients having longer durations of postictal suppression. We confirm the positive correlation between PGES and EDA measures in a larger cohort of patients. In addition, we note that autonomic changes following a GTC are different depending on age with longer, and more prominent sympathetic activity noted in older individuals. Further studies are needed to confirm this finding, which may have implications for the pathophysiology of SUDEP.

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